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STATISTICAL PANORAMA

$15.00 / APRIL 8, 1985

RANKING THE STATES FOR HOME FUEL USE
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THE NEWS
THE INDUSTRY WEEKLY
A PUBLICATION OF BUSINESS NEWS PUBLISHING CO.

A Tecumseh rotating vane rotary compressor model K 7512 (8,630 Btu/hr. 8.18 Btu/watt). One of a production run made for Admiral in October 1957, this rotary has operated, without service, for 26 hot summers.

"Dirty, rusty, and running beautifully after 25 years."

Now a quarter of a century later – if a rotary compressor is right for your system application, then chances are good that one of Tecumseh's "advanced design" rotaries will not only fill the bill, but deliver a lot more Btu's per watt as well.

Rotary compressor technology –
Reciprocating compressor technology –
Tecumseh's designs continue to pace the industry.

TECUMSEH PRODUCTS COMPANY
Tecumseh, Michigan

Model RK (20 Frame)
9,200 – 13,000 Btu

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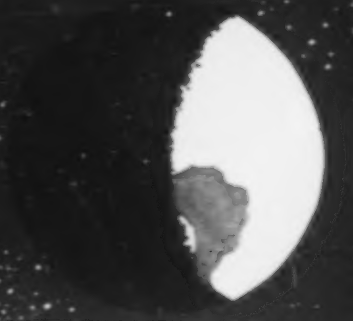
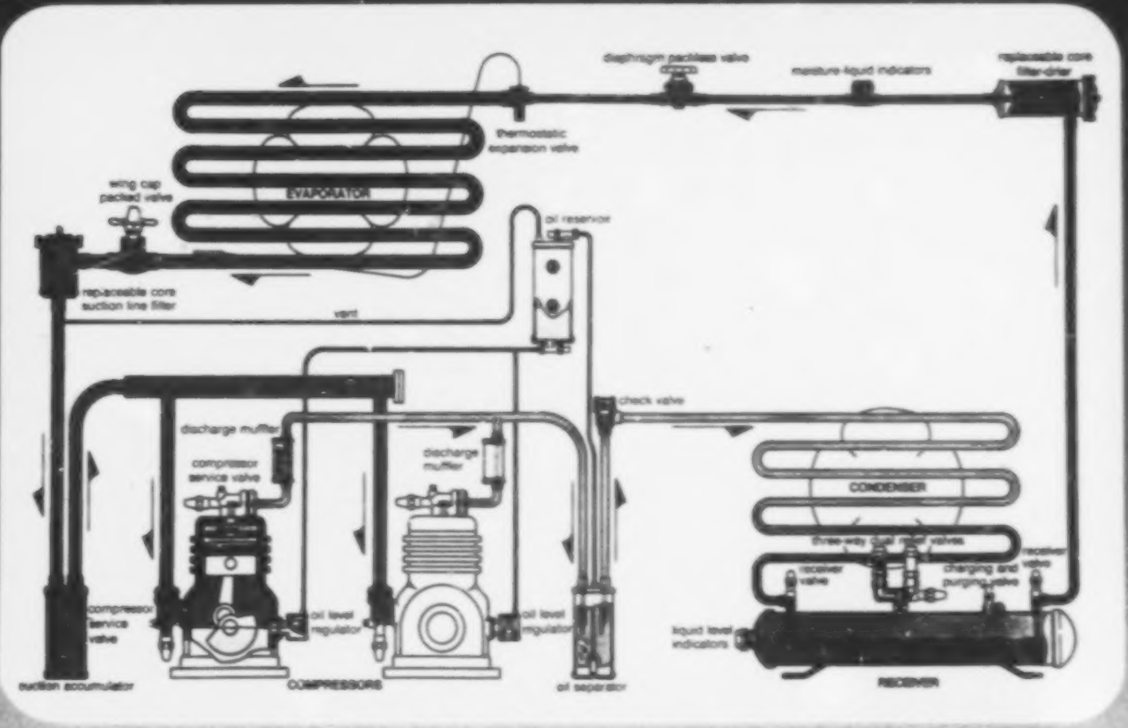
From beginning to end.

A WORLD OF DIFFERENCE





diaphragm packless valve
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replaceable core filter-drier
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Henry Valve provides the products to keep your air conditioning and refrigeration systems functioning efficiently day in and day out.

Keeping people and products cool, comfortable and fresh is an area we excel. For over 60 years, our valves, accessories and compressor protective devices have been instrumental in assuring cool performance.

FREE colorful diagram available, write for SP 500.

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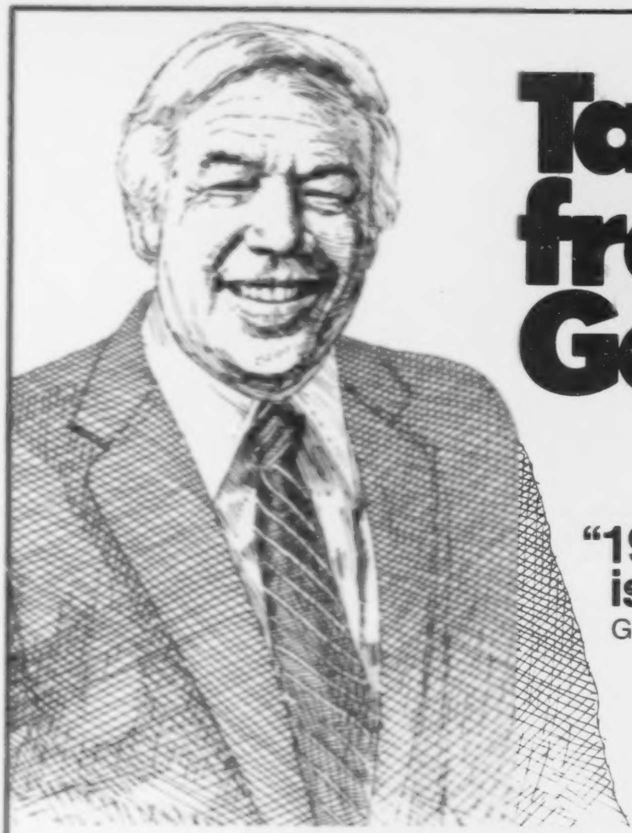

Take it from George.

"1985 is your year."
George Kennedy, York spokesman.

This is the second year George Kennedy, our spokesman and yours, is telling consumers on radio, TV, and in newspapers to make "The Right Decision" and buy YORK.

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They'll help you clear up the confusion about energy ratings, BTU's, and capacities. And they'll help you calculate cooling or heating estimated operating costs, and equipment payback periods.

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The right decision.™

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SPECIALISTS

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April 8, 1985
Vol. 164, No. 14, Serial No. 2922

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ABP

SEVEN MILLION SOLD.

Crystar® hot surface igniters light gas best.

Efficient, reliable and safe, this state-of-the art igniter vastly improves home heating systems – just as it improves most new American gas ranges and dryers. Manufacturers increasingly insist on the Crystar hot surface igniter over pilot lights and sparks. Why?

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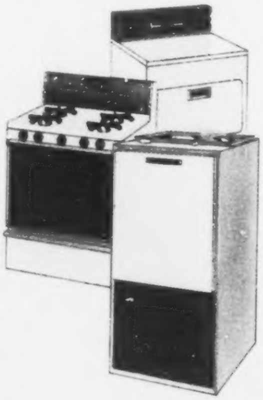
- Crystar igniters are AGA-approved for all leading control systems.

Over seven million Norton Crystar igniters are in use. Inexpensive, safe and reliable, it's easy to see why homeowners, servicemen and manufacturers think they're a great idea. Norton Company, Industrial Ceramics, Worcester, Massachusetts 01606.



NORTON

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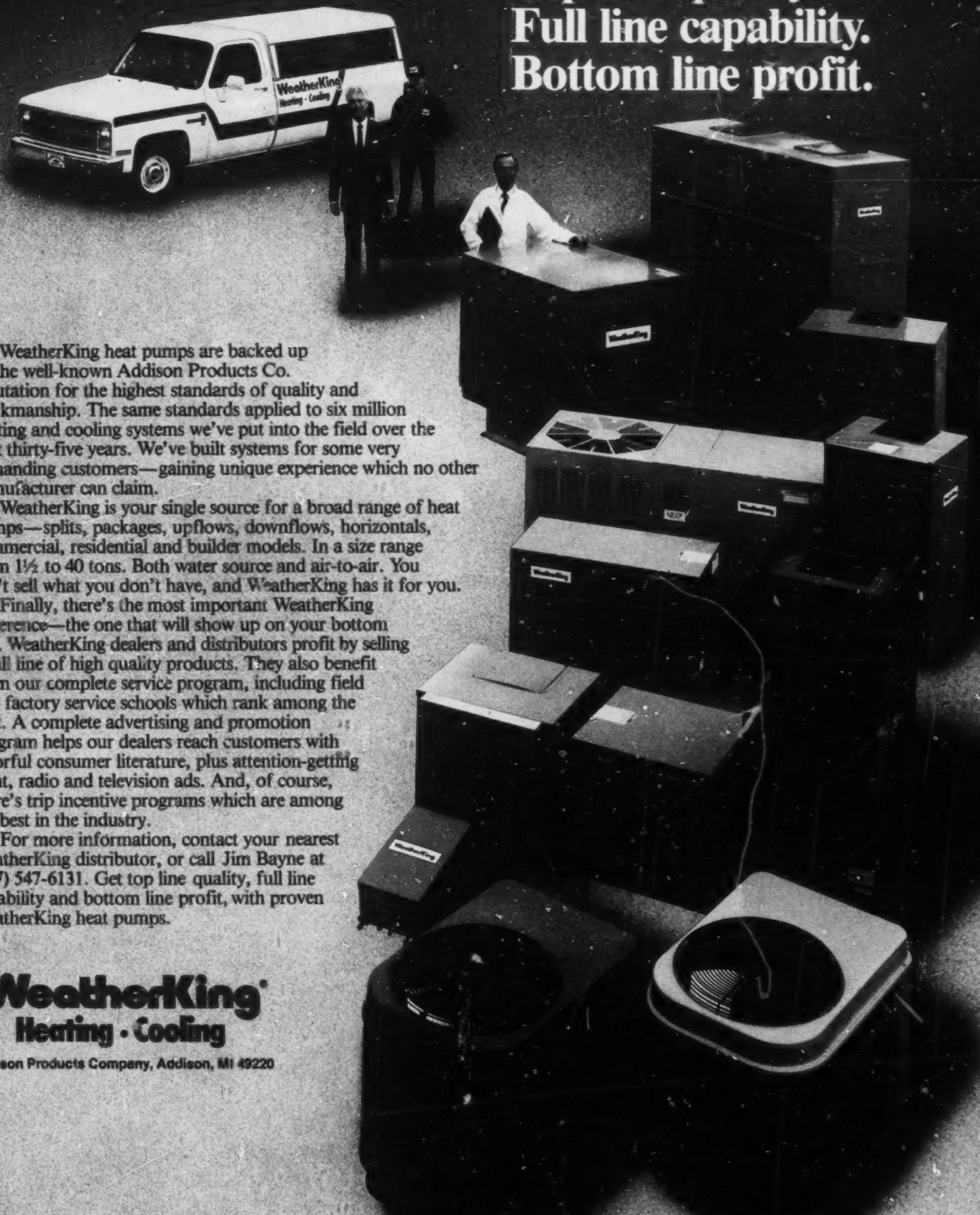
WeatherKing Heat Pumps.
Top line quality.
Full line capability.
Bottom line profit.



WeatherKing heat pumps are backed up by the well-known Addison Products Co. reputation for the highest standards of quality and workmanship. The same standards applied to six million heating and cooling systems we've put into the field over the past thirty-five years. We've built systems for some very demanding customers—gaining unique experience which no other manufacturer can claim.

WeatherKing is your single source for a broad range of heat pumps—splits, packages, upflows, downflows, horizontals, commercial, residential and builder models. In a size range from 1½ to 40 tons. Both water source and air-to-air. You can't sell what you don't have, and WeatherKing has it for you.

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For more information, contact your nearest WeatherKing distributor, or call Jim Bayne at (517) 547-6131. Get top line quality, full line capability and bottom line profit, with proven WeatherKing heat pumps.

WeatherKing®
Heating · Cooling
Addison Products Company, Addison, MI 49220

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Washington 88
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15 THE LENNOX SPEC SHEET

HOW LENNOX BUILDS IN THE INNOVATIVE FEATURES THAT HELP YOU CLINCH HOME SALES.

For homeowners, there's efficiency and dependability inside every Lennox air conditioner.

For you, there are built-in selling advantages.

Lennox knows that whether your market is replacement or new construction, you need more from a residential air conditioner than a high level of efficiency and quality.

That's why the Lennox HS18, HS16 and HS14 each have something extra: built-in buyer demand.

Consumers know the name Lennox stands for savings, summer after long, hot summer.

And that makes it easy to boost your sales. Just team up with Dave Lennox and the Lennox line of quality air conditioners.

► *With a SEER* of up to 9.0, the Lennox HS18 is your best choice when the job calls for an efficient, yet moderately-priced, air conditioner.*

Accordingly, Lennox engineers have achieved a compact size without sacrificing Lennox quality. Homeowners are sold on the HS18's built-in protection devices, vibration-free operation and an efficiency rating that qualifies for most utility rebate programs. So it's easy to see that the HS18 has what it takes to make your sales picture look brighter.

The HS18

12,300-60,000 Btuh

Vertical discharge *allows hidden installation behind shrubs or on rooftop.*

Direct-drive fan *efficiently moves massive amounts of air for high refrigerant cooling capacity.*

High pressure shut-off switch *watches over discharge pressure, protects compressor.*

The HS16

19,200-61,000 Btuh

100% copper tubes *are machine-fitted by Lennox to ripple-edge fins for reliable performance and easier service.*

Hermetically-sealed compressor *has built-in protection from excessive current and temperatures.*

Self-regulated crankcase heater *operates only when needed. Saves energy. Prolongs compressor life.*

*Seasonal Efficiency Rating Based on DOE test procedures.

► *When your customers demand added efficiency, look no further than the HS16.* Lennox has combined every top-of-the-line feature – including a money-saving SEER* of up to 10.0 – into one buyer-attracting package. Plus, you can offer the Lennox tradition of reliability as part of the savings. The HS16 is designed to withstand the toughest operating demands, because it has more protection than most competitive units. Both high and low pressure switches insure maximum safeguards against compressor damage. Coils are easy to clean and service access is quick, so maintaining the HS16's performance is nearly effortless.

► *The HS14 Power Saver® has everybody talking about the remarkable efficiency of its revolutionary Lennox two-speed compressor.* It's one reason the Power Saver boasts the industry's highest SEER* – 15.0. The exclusive Lennox two-speed compressor shifts into high speed only when cooling demand is at its greatest. Low speed operation is maintained 90% of the time. Allowing the Power Saver to offer incredible savings on energy use and the promise of long life, trouble-free operation.

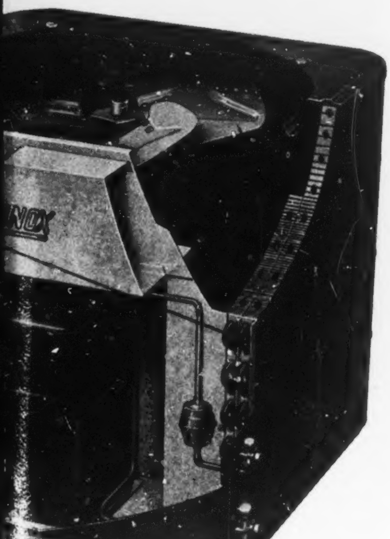
Isn't it time you started increasing your sales with one of the best-built, best-designed, best-recognized air conditioner lines in America? Take a moment today to write or call Lennox Industries Inc., Dept. 123, P.O. Box 809000, Dallas, Texas 75380.

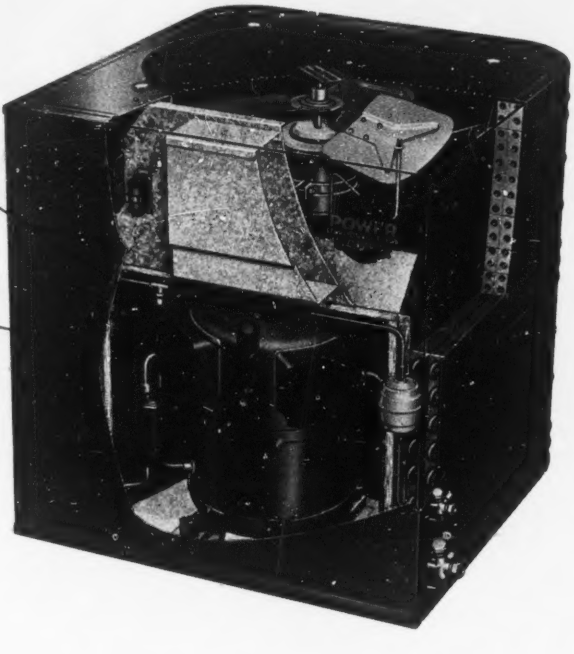
As Dave Lennox says,

"There's nothing better for your bottom line than the Lennox line!"

LENNOX

The HS14 Power Saver®
32,800-64,000 Btuh





Exclusive Lennox two-speed compressor *matches power to cooling demand. Cuts cooling bills nearly in half.*

Durable galvanized steel cabinet *has weather-resistant baked-on enamel finish.*

Unit is factory assembled, wired and pre-charged for quick, easy installation.

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Coleman

ON THE MO

Coleman Residential Heating and Air Conditioning is "On the Move!" We're committed to dynamic growth in the marketplace and making the changes necessary to get it.

ON THE MOVE with PRODUCTS!

Last year we introduced four new product lines, but "you ain't seen nothin' yet." This year we'll unveil dynamic, new heat pumps, air conditioners, furnaces and air handlers to broaden the line even more.

ON THE MOVE with DISTRIBUTION!

We're expanding our distribution. We got a good start last year and we want to finish the job this year. Like the Marines say, "We're looking for a few good men." So if you qualify, call us today.

If your current product line has you sitting still, get on the move with Coleman. We're going places!

GET "ON THE MOVE" WITH COLEMAN!

ON THE MOVE with PROGRAMS!

Our unique distributor/dealer-oriented programs are designed to provide maximum flexibility for planning on a regional basis. And, our exclusive incentive trip program is second to none.

ON THE MOVE with PRICING!

Coleman has made a major commitment to develop high-efficiency, high-quality products that are competitively priced. If you've checked the price of our 90 series gas furnace you know we're serious. You always knew Coleman was best, now you know it's affordably priced.

For more information contact:
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Residential Products Division
P.O. Box 1762, Wichita, KS 67201
(316) 832-6441

Coleman
HEATING & AIR CONDITIONING

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1985 The Coleman Company, Inc

The only valve you can service in seconds with one wrench.

Our exclusive "T" Series Take-A-Part Thermo® Valve is simplicity itself.

If you ever have to service it, just loosen two screws and lift out the cage. You'll never have to break the connections.

As for versatility, over 1200 combinations of interchangeable power heads, cages and body flanges let you mix and match from stock to fit your job exactly — for anything from heat pumps to commercial units, 1/2 to 100-ton capacities.

Easy order, easy service. Alco "T" Series with large diaphragms for smooth precise control. What could be simpler? See your Alco Wholesaler Pro, or call us at 1-800-322-ALCO.

ALCO...leading the way in flow controls.

One wrench — two bolts — 30 seconds and over 1200 component combinations. That makes Alco's Take-A-Part the simplest, most versatile valve you can stock.

Alco's revolutionary EK-Plus filter-drier, with its efficient bead medium, proves once and for all that way, acid, water and other contaminants can be completely eliminated.

ALCO CONTROLS

Alco Controls Division, Emerson Electric Co., P.O. Box 12700, St. Louis, MO 63141, Telex: 209885

EMERSON

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CARRIER BRINGS ITS ROOFTOP TECHNOLOGY INSIDE.

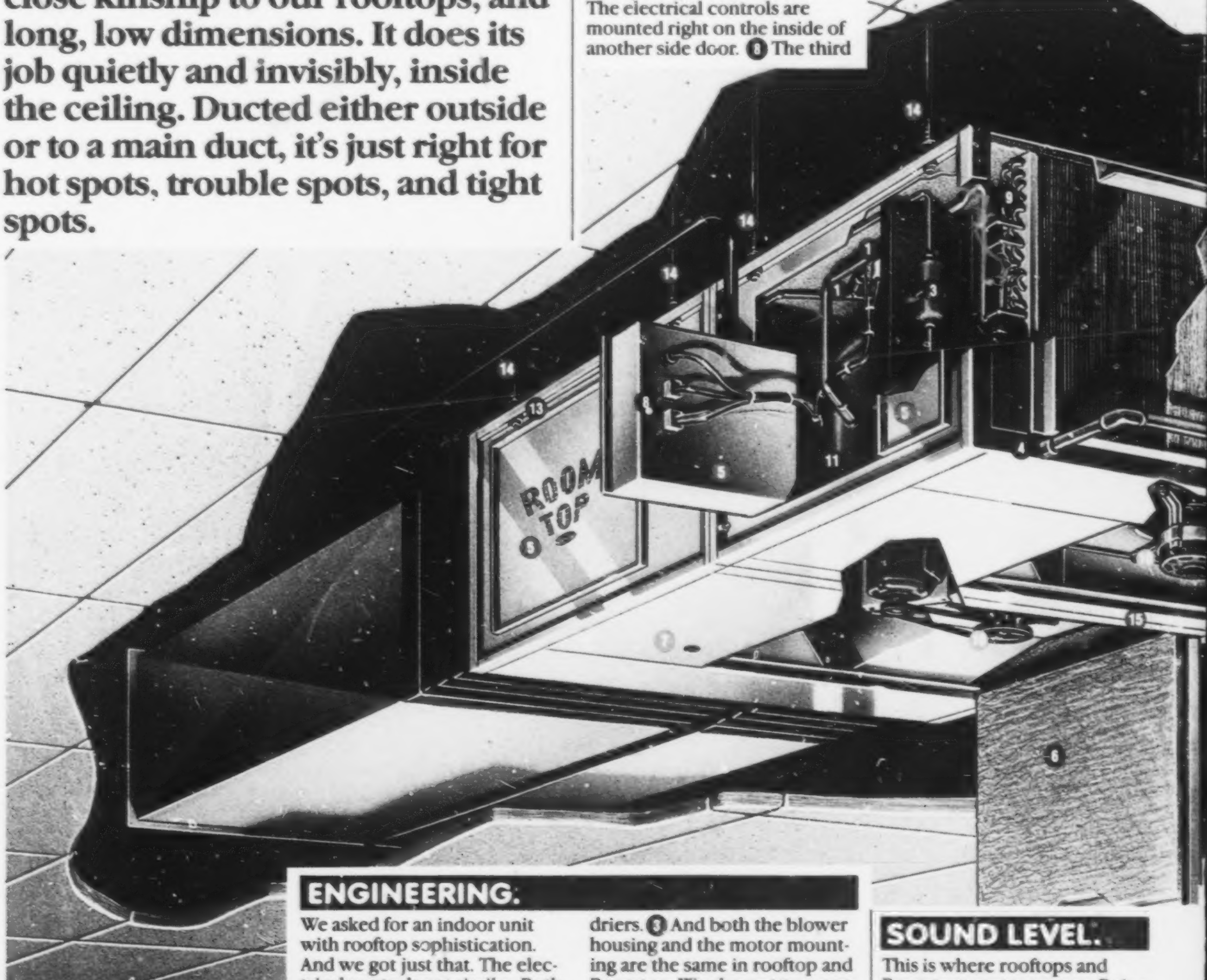
INTRODUCING THE ROOMTOP–2, 3, 4, OR 5 TONS

IT HITS THE SPOT.

A toast to our new commercial Roomtop. It doesn't take an inch of floor space, or wall space, either. And it doesn't drip on people's heads, or stain walls or ceilings. It's got high energy ratings, close kinship to our rooftops, and long, low dimensions. It does its job quietly and invisibly, inside the ceiling. Ducted either outside or to a main duct, it's just right for hot spots, trouble spots, and tight spots.

MAINTENANCE.

Our Roomtops are fully maintainable in the ceiling. The units have a total of five doors, three on one side ⑤ and two along the bottom, ⑥ held in place with quarter turn fasteners. The condenser coil is accessible through a bottom door and a side door for cleaning with a threaded drain plug ⑦ in the drain pan allowing for a temporary hose connection. The electrical controls are mounted right on the inside of another side door. ⑧ The third side door opens on the evaporator coil. ⑨ When this door is left closed, it also serves the purpose of preventing the escape of air and allows the unit to be run while the controls are being worked on. The remaining bottom door swings open and down for complete access to fans, motors, ⑩ drives, and drains.



DIMENSIONS.

One of the most important things about the Roomtop is its height. Which is low. It'll fit in the ceiling. The 2- and 3-ton Roomtops are only 16¾" high; the 4- and 5-ton models only 23⅝" high. Length for all is 66", width 49". Although the Roomtop is a single package cooling unit, it can be field split.

ENGINEERING.

We asked for an indoor unit with rooftop sophistication. And we got just that. The electrical controls are similar. Both our rooftops and our new Roomtops have Cycle-LOC compressor protection, crankcase heaters, Hi-Low pressure switches, ① and internal line-break compressor protection. The coil circuiting in both is counterflow for the most effective heat transfer. The filter is factory-installed and cleanable. ② The Roomtop, a true commercial product like the rooftops, has liquid line filter driers. ③ And both the blower housing and the motor mounting are the same in rooftop and Roomtop. We also put two centrifugal fans in the Roomtop, gave it dual drains, ④ five access doors for ceiling maintenance, an integral hanging bracket, and thermal cabinet insulation — all for the enhancement of its indoor role.

ROOM
TOP

SOUND LEVEL.

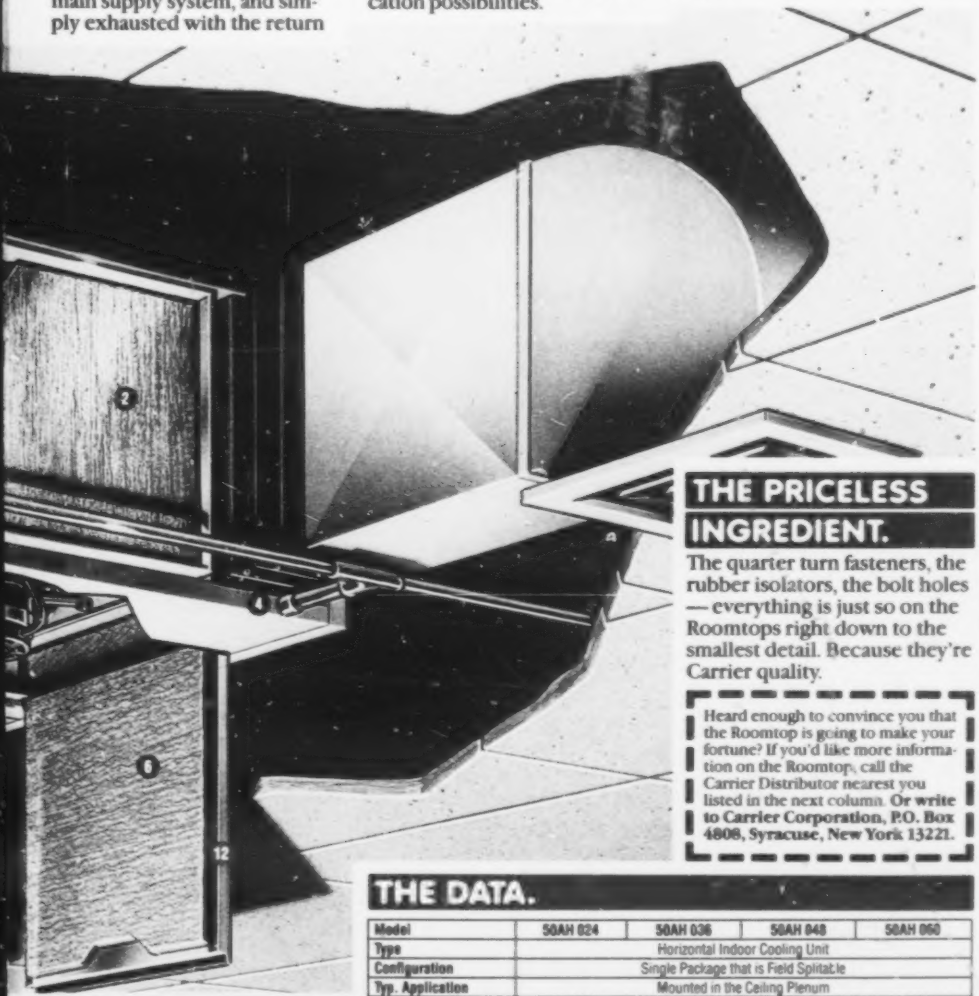
This is where rooftops and Roomtops part company. Being made for indoor use, we were far more concerned with making the Roomtops quiet. We put rubber vibration isolators on the compressor ⑪ and fan motors. One of our considerations in using centrifugal fans was their low operating sound. And we heavily insulated the cabinet panels. ⑫ The Roomtops have a sound level comparable to a competitive water source, single fan heat pump.

OF AIR CONDITIONING UNDER 2 FEET TALL.

VERSATILITY.

Yes, the Roomtop is a ceiling-mounted unit. But that's just the beginning. Since both the evaporator and the condenser sections can be ducted, the Roomtop can be placed in the center of the space to be cooled. Or off to one side. Or flush with a wall. It can be ducted to the outside, or to a main supply system, and simply exhausted with the return air above the ceiling. It can be installed as one package or field split. Further, since the unit can be split, the condenser section can be placed horizontally or vertically if the application calls for ducting up to another floor, or down. All this makes for great versatility and increases the Roomtop application possibilities.

THE COMPETITION.



THE PRICELESS INGREDIENT.

The quarter turn fasteners, the rubber isolators, the bolt holes — everything is just so on the Roomtops right down to the smallest detail. Because they're Carrier quality.

Heard enough to convince you that the Roomtop is going to make your fortune? If you'd like more information on the Roomtop, call the Carrier Distributor nearest you listed in the next column. **Or write to Carrier Corporation, P.O. Box 4808, Syracuse, New York 13221.**

INSTALLATION.

Here's more good news about the Roomtop. It's easy to install which makes it just the reverse of costly. It uses simple 24-volt wiring for the thermostat. And its integral hanging bracket ⑬ needs only 4 hangers ⑭ bolted on to fix it in place permanently. Since the condenser section and the evaporator section are both ducted, the Roomtop can be field split, ⑮ in which case each section has 4 bolt holes for hanging and only refrigerant line and wiring need to be run between them.

THE DATA.

Model	**50AH 024**	**50AH 036**	**50AH 048**	**50AH 060**
Type	Horizontal Indoor Cooling Unit			
Configuration	Single Package that is Field Splitable			
Typ. Application	Mounted in the Ceiling Plenum			
Cool. Cap. (ARI) (Btuh)	27,000	37,000	48,000	60,000
Voltages	230-1-60	230-1-60 208/230-3-60	230-1-60 208/230-3-60 460-3-60	230-1-60 208/230-3-60 460-3-60
EVAP CFM Range	600-1000	900-1300	1200-1900	1500-2200
EVAP ESP INWG	0.20-0.68	0.08-0.77	0.01-0.56	0.02-0.80
COND ESP INWG (MAX)	0.40	0.60	0.60	0.60
TOTAL KW (ARI)	3.4	4.6	5.6	7.7
EER	8.0	8.0	8.6	7.8
SEER	8.2	8.1	9.3	9.4
Overall Dim. (L x W x H)	66" x 49" x 16¾"	66" x 49" x 16¾"	66" x 49" x 23⅝"	66" x 49" x 23⅝"
EVAP Duct Dim. **Supply** **Return**	14"h x 7⅛"w 14"h x 33⅝"w	14"h x 7⅛"w 14"h x 33⅝"w	20⅞"h x 7⅛"w 20⅞"h x 33⅝"w	20⅞"h x 7⅛"w 20⅞"h x 33⅝"w
COND Duct Dim. **Supply** **Return**	14"h x 14½"w 14"h x 30"w	14"h x 14½"w 14"h x 30"w	20⅞"h x 14½"w 20⅞"h x 30"w	20⅞"h x 14½"w 20⅞"h x 30"w
Oper. Wt. (lbs)	480	500	580	590
Comp. Type	Hermetic	Hermetic	Hermetic	Hermetic
EVAP Fan Type	Centrifugal Direct Drive			
COND Fan Type	Cent. Dir. Drive	Centrifugal Belt Drive		
AIR Filters/No.	Factory Supplied Cleanable/(1)			

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GGK

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	Mobile	(205)	476-2220
	Montgomery	(205)	264-6363
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AR	Little Rock	(501)	376-4471
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	New Haven	(203)	795-6011
DE	Wilmington	(302)	762-2131
DC	Alexandria, VA	(703)	548-2045
FL	Clearwater	(813)	577-2222
	Fort Myers	(813)	656-0500
	Jacksonville	(904)	737-0610
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	Ocoee	(305)	656-1014
	Riviera Beach	(305)	845-7505
	Tallahassee	(904)	877-1196
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STATISTICAL PANORAMA

by Gordon D. Duffy and Thomas A. Mahoney

Forecasts

AIR CONDITIONING

Even though the new home market continued strong last year, only an unexpected surge in the replacement market could explain the 24% increase in unitary shipments. We're looking for a 4.5% drop this year to 3,160,000 units, the second year for more than 3 million shipments. Inventories should continue lean and replacements strong; only new residential construction will slip. Light commercial could even grow a bit.

HEAT PUMPS

The strength of the light commercial market is unlikely to help air-to-air heat pump shipments this year. An expected drop in new home starts, particularly in the South and West where this product is strongest, will result in a 6% decrease in heat pump shipments in 1985 to 700,000 units, or even a bit lower.

FURNACES

Gas, oil, and electric furnace shipments increased by 10.5% last year, or about four times the increase in housing starts. Although these products for many years have been almost in lockstep with housing starts, a whole new market has evolved over the past three years that promises to change that rule of thumb. It's called replacement for the sake of efficiency and it will hold this market even at 2.35 million units in 1985 even though housing drops.

BOILERS

Most of the boilers shipped in recent years have been replacements, particularly in the Northeast and parts of the Midwest where the comfort quality of hydronic heating systems is not overshadowed by the need for comfort cooling. We think this market will continue in 1985 at 275,000 units, or close to last year's performance, thanks to continued replacement strength.

CHILLERS

Thanks to an office building market that keeps showing more-than-expected strength and a Far East export market that still can be served from the U.S. despite the penalties exacted by a strong U.S. dollar, the chiller market has suffered far less than predicted. We feel it will hold up for another year at 11,200 units and, perhaps by 1986, we can expect some growth as U.S. products get more competitive abroad.

ROOM AIR CONDITIONING

Shipment levels for room air conditioners are hard to predict. Still largely an impulse purchase dependent on hot weather for volume increases at home, room units have fared badly abroad because of stiff competition from the Japanese and the disadvantage of a strong dollar. Exports, which amounted to 25% of production for years, now account for only 4%. Look for another year in the 3.1 million range.

COMMERCIAL REFRIGERATION

Strong growth in the retail store and shopping center segments of the commercial new construction market, the result of the recovery in new home construction, is good news for the commercial refrigeration market. New supermarkets, together with remodels of older stores, should produce a 7% increase in 1985 to 100,000 units.

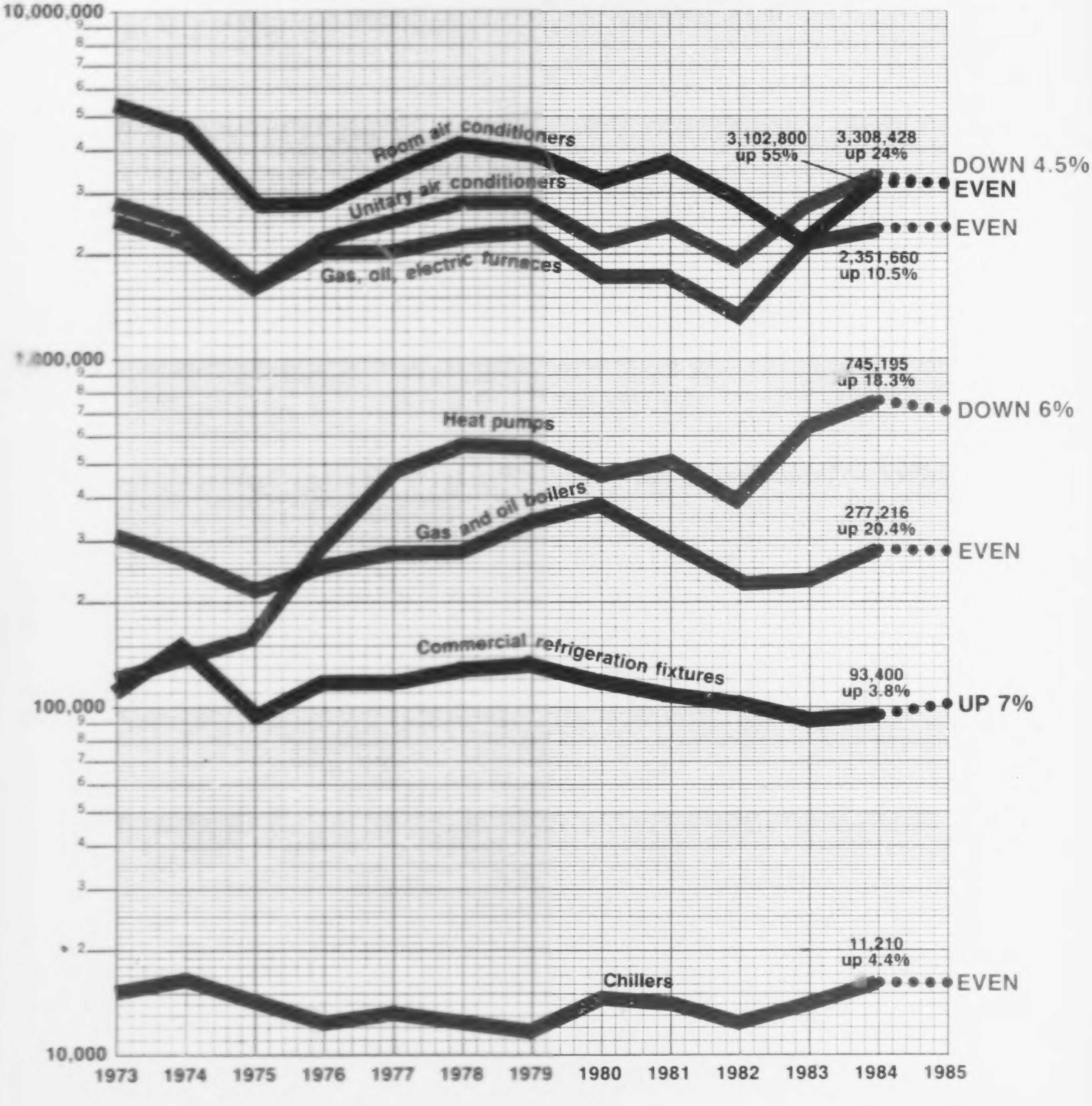
HOUSING

When we consider that new home construction probably will slip by about 5% this year to 1,650,000 units, we must also consider that 1985 will join the two previous years as a relatively good time for home building, which only three years ago was struggling at slightly over 1 million starts. Remember, too, that this market is extremely sensitive to interest rates and, should mortgage rates climb beyond 13%, look for the start rate to cool.

REPLACEMENTS

Relatively high levels of new home and light commercial construction and traditional replacement rates alone could not account for the boom in residential equipment shipments in the past few years. A whole new market — replacements of working units for the sake of efficiency — has blossomed almost overnight to add close to a million furnaces and central air conditioners to an already respectable replacement market.

Industry trends



1985 in perspective

In ordinary times, the prospect of a year in which the comfort heating-cooling and refrigeration industries will do well to stay even — or maybe even decline a bit — could not be considered great news. But when that hold-the-line point is at the high levels recorded in 1984, there will be few complaints.

As we push through the first quarter of 1985, the spectre of the next recession haunts the nation's cycle-conscious economists. Yet that prospect is not likely to become a reality until late in the year, if then, as a spirit of moderation becomes more and more prevalent.

But behind the good times of 1984 and the promise of more to come this year is the stark reality of a federal budget deficit of $175 billion in fiscal 1984 that shows no sign of diminishing, and a $123 billion trade deficit caused, in large measure, by a "hard" dollar that has increased in value by more than 60% over major world currencies in the past four years.

Neither the economists nor this newspaper can forecast what will happen when we are forced to reckon with these realities, as well we must. And although the deficits in trade and in the federal budget are not likely to upset the economy this year, the prospects become more ominous with each passing month. Perhaps they represent the most powerful moderating influence.

Housing, which led the way back from the 1980-1982 recession, increased by only 2.5% last year. But a dramatic increase in replacement sales of both heating and cooling equipment brought unitary air conditioning shipments a 24% increase to 3.3 million units and 2.35 million furnace shipments, up 10.5%.

The commercial office building market, which held even in 1983, produced a surprising 23.6% surge last year and, if bidding volume is any indicator, could show a 40% burst in 1985. The stars of the commercial market, however, are the retail stores and shopping centers that showed a 48.4% increase last year and promise another 36% gain in 1985.

Industrial construction, which showed only an 8% gain (in current dollars) last year, is expected to increase by about 25% this year, partly because of tax incentives and partly because of higher production levels, but in the first quarter this disappointing market segment was running that much behind last year's performance.

The light commercial market, which serves smaller office buildings, retail establishments, and shopping centers, showed a strong recovery in 1984 that should carry forward through this year. The commercial refrigeration market, which showed modest gains last year, should grow at least by another 7% this year, thanks to new shopping center construction that traditionally follows the housing recovery.

The industrial refrigeration market, which declined slightly in 1983, partially recovered last year and should share in this year's industrial market recovery.

The 3.3 million unitary air conditioning total represented a 24% increase over the previous year and marked the first time in history unitary shipments have topped the 3 million-unit mark. Included in that number were 745,195 air-to-air heat pumps, an 18.3% increase for a product that continues to provide stiff competition for gas and oil furnaces.

Although multifamily housing starts in 1985 will continue to show some strength, a weakening of single-family home demand caused by continuing high mortgage rates should produce a 5.4% drop in new home starts. We ex-

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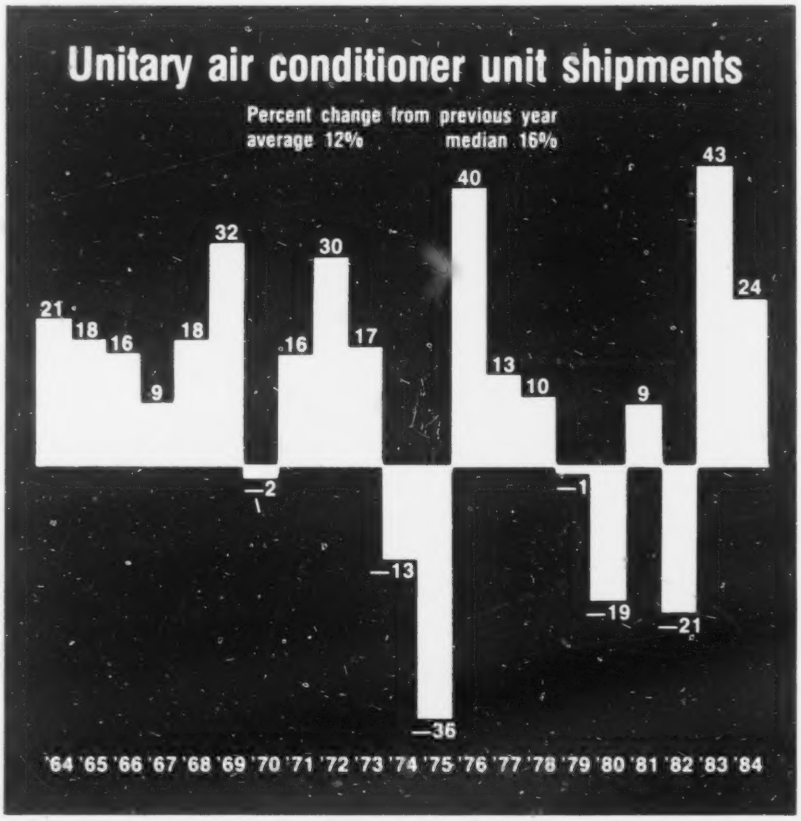

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FROM PAGE 16

pect 1985 housing starts will finish up at about 1,650,000 units.

Partly because of the drop in housing starts, but mostly because the replacement-generating utility incentive programs peaked in 1984, we feel that unitary air conditioning shipments will total 3,160,000 this year — a drop of 4.5% from last year's level but the second 3 million-plus year in a row. Heat pumps, more sensitive to single-family home starts, probably will decline 6% to 700,000 units.

Importantly, 1984 was the second year in which year-end unitary inventory represented only 26% of shipments. In the past, inventories have run at about 30% to 33% of shipments. This development lends credence to the theory advanced by some that there has been an industry-wide improvement in distribution efficiency in the last two years.

On the heating side, the most dramatic development has been the public's willingness to pay premium prices for gas- and oil-fired furnaces with high efficiencies in order to save money on their fuel bills.

Only four years ago, the atmospheric gas furnace that was a standard throughout the industry could boast of an annual efficiency of only 60% to 65%. With electronic ignition and a flue damper, these furnaces could move into the 70% range.

But then one manufacturer offered a gas furnace with an annual efficiency in the mid 80% range and another offered one in the mid 90% range. Within three years, nearly all manufacturers have been able to offer furnaces in the 80% to 86% annual efficiency range equipped with induced draft or power burners. And many have been able to offer condensing gas furnaces with annual efficiencies higher than 86%.

In 1983, a surprising 256,120 gas furnaces — or 15.4% of total shipments that year — had seasonal efficiencies of 80% or more. And of these, 116,805 furnaces, or 7% of total shipments that year, had seasonal efficiencies of 86% or more. It must be remembered that, at that time, not all manufacturers could offer high-efficiency furnaces in those ranges.

Last year, the first year in which most manufacturers could offer homeowners a choice of efficiencies, a total of 574,595 gas furnaces — or 31% of the total shipments in 1984 — had seasonal efficiencies of 80% or better. Of these, 206,050 units, or 11.1% of the total units shipped, had seasonal efficiencies of 86% or more, according to figures compiled by the Gas Appliance Manufacturers Association (GAMA).

GAMA also reported (see "Comfort in construction") that 30,830 oil-fired furnaces, or 24.2% of the total shipped in 1983, had seasonal efficiencies of 80% or more. Last year, that number

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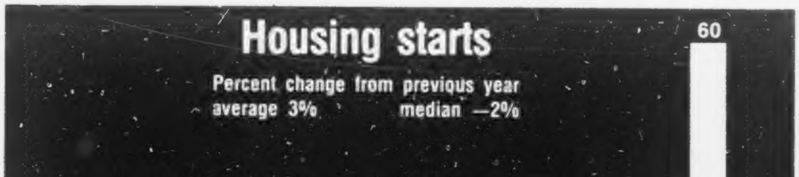

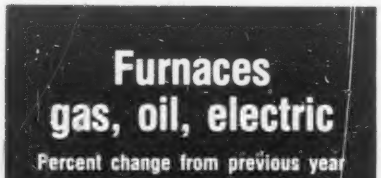

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had grown to 47,645 units, or 32.2% of the total, but those with annual efficiencies of less than 75% also had grown from 5.9% of shipments in 1983 to 8.4% last year.

The public's acceptance of high-efficiency gas- and oil-fired furnaces and boilers was not entirely unexpected. It's a logical extension of the earlier phenomenal acceptance of high-efficiency air conditioners, heat pumps, and oil burners. We say phenomenal because this trend was clearly evident even in years of economic uncertainty when the higher equipment costs were an even more important consideration.

An early indication that this phenomenon was true for furnaces came when a survey conducted by the manufacturer of the first condensing furnace on the market revealed that three out of four customers had replaced furnaces in good working order for reasons of efficiency. It should also be noted that, unlike central air conditioners and heat pumps where many electric utilities offer rebates for those who install high-efficiency units, there are few, if any, rebates for those who install gas- or oil-fired furnaces.

The Air-Conditioning and Refrigeration Institute (ARI) reported that the sales-weighted average SEER (seasonal energy efficiency ratio) for all cooling-only unitary air conditioners of 65,000 Btuh or less shipped in 1984 was 8.66, or 2.7% higher than the 8.429 SEER average for cooling-only units shipped in the previous year.

Similarly, the sales weighted average SEER for air-to-air heat pumps in the same size category shipped last year was 8.419, or 2.2% higher than the 8.234 SEER average for heat pumps shipped in 1983.

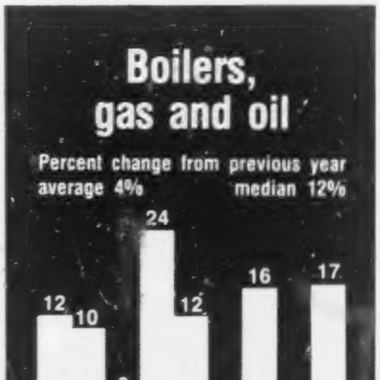
Looking at the average EER's and SEER's (after 1980) for all cooling-only unitary shipments, they moved upward steadily from 7.03 in 1976 to 8.31 in 1982 and 8.66 last year. For heat pumps, the averages climbed from 6.87 in 1976 to 7.97 in 1982 and 8.419 last year.

Although regulators in some states with high mandatory minimum efficiencies would like to believe otherwise, this regular upward progression of efficiency improvements for both heating and cooling equipment reflects a widespread market-driven phenomenon that has little to do with government intervention.

A major factor in the acceptance of higher efficiencies for both air conditioners and heat pumps has been the incentives offered by electric utilities who find it cheaper to pay homeowners to buy high-efficiency comfort cooling equipment than to buy new generating equipment to meet summer peak power needs.

A survey conducted by ARI last year revealed that 50 electric utilities across the nation were offering incentive programs. We feel that these incentive programs now have stabilized to the point that, as new programs start, older programs that have served their purpose will be discontinued. This influence, although important, is unlikely to show much growth in the residential sector. A few utilities, particularly in California, are offering incentives to some classes of commercial customers.

It must also be remembered that today's homeowners use air conditioning differently from, say, ten years ago when energy was relatively cheap. This was shown dramatically in a study conducted by the Energy Information Administration and included in the 1982 Housing Characteristics.



The study projected that, of 23.4 million homes with central air conditioning, only 32.6% used their air conditioning all summer. Another 38.9% used the central system "a few times" and 20% used it "quite a bit." Of the remainder, 4.5% did not use their air conditioners at all in 1982 and 4% were not living in their homes that summer.

There were regional contrasts. In the south, 36.4% used their air conditioning all summer but an almost equal number (35.6%) said they used it only a few times and 17.6% said they used it quite a bit. In the Northeast, only 6.8% of the homes used their air conditioning all summer, 11.9% used it quite a bit, and 67.6% used it only a few times. Of those who use room air conditioners, 60.2% used them a few times, 13.2% used them quite a bit, and only 11.1% used them all summer.

Taken together with the penetration of air conditioning in new homes (70% of single-family and 89% of multifamily homes completed last year), it seems clear that U.S. homeowners want the availability of comfort cooling in increasing numbers — but they are also increasingly selective in just how they use it.

Behind this trend and the trend to higher efficiencies have been the three- and four-fold increases in basic fuel costs over the past decade. Even since 1979, natural gas prices nationally have increased by 91% and electricity costs have gone up by 58%. Industry and homeowners have changed their attitudes about how they use energy.

In fact, it took 59,150 Btu to generate a 1972 constant dollar of gross national product in 1973. But in 1983, the latest year for which complete figures are available, it took only 45,930 Btu to generate a constant dollar of GNP, or 22.4% less. That, in gross terms, has been the net effect of energy conservation in the U.S. to date. Most of the reduction has come from the industrial and transportation sectors, although the residential and commercial sectors have contributed by limiting growth.

Looking at national residential fuel costs last year in relation to the year before, we find that natural gas prices increased by only 1% and the cost of electricity increased by 5%. The cost of No. 2 fuel oil held steady.

It would appear that, at least in the short term, fuel prices have pretty well stabilized. Projections indicate that

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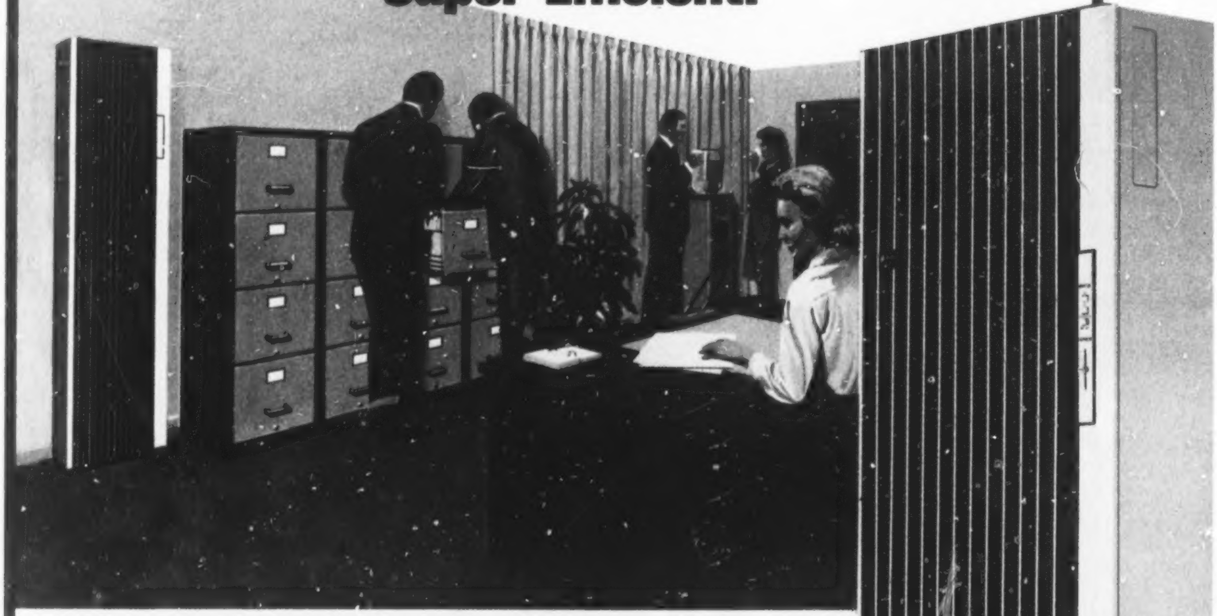

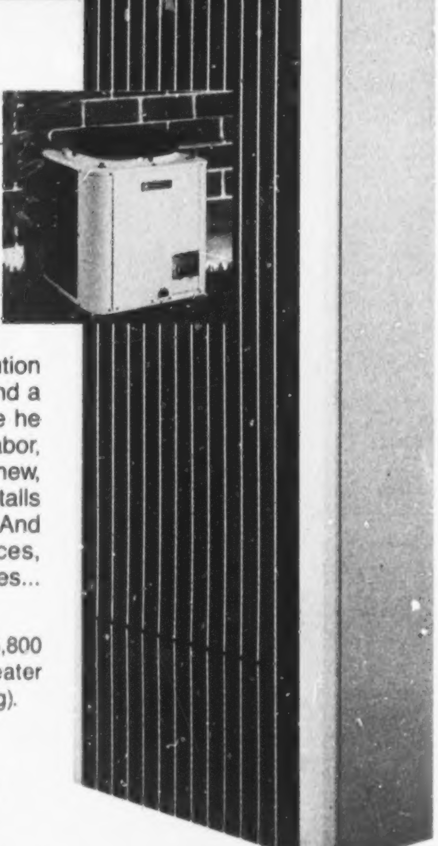

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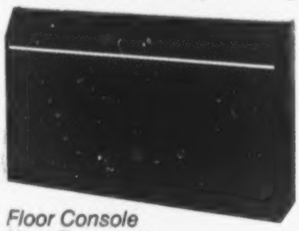

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FROM PAGE 22

natural gas prices over the next few years will increase at slightly less than the rate of inflation while electricity prices will increase at slightly more than the rate of inflation. Fuel oil, which already has dropped by at least 12% in most localities, could drop in price by a few cents a gallon this year.

The decontrol of much of the interstate natural gas supply at the beginning of 1985 did not cause a ripple in the price of the fuel. The prime reason is that, with the lowering of world oil prices, heavy oil now is competitive with natural gas in the industrial market which gas utilities depend on for 60% of their volume.

There is evidence, too, that the battle of the fuels, which went underground for a decade, is heating up again. The residential gas market has been impacted by the success of the heat pump. And gas utilities are resisting attempts by electric utilities to rub salt in the wound by promoting the use of add-on split-system heat pumps on gas furnaces so that homeowners can get a fuel cost advantage during mild winter weather.

There are some who argue that the strategy of adding a heat pump to a gas furnace is outdated because it is intended to minimize the standby losses of an atmospheric gas furnace. With the new high-efficiency gas furnaces, they say standby losses are minimal and homeowners would be wiser to use a high-efficiency gas furnace and air conditioner.

Overall, 1984 was a slightly better year for such accessories as power humidifiers and electronic air cleaners. Unlike efficiency, however, it would appear that homeowners see these products as competitors with vacations and other options rather than as an investment. Too, heat pump domestic hot water heaters, which were introduced with some fanfare a few years ago, have not captured the imagination of consumers.

Even though the Department of Energy decided that mandatory minimum efficiency standards for residential heating and cooling equipment could not be justified, 23 of the 50 states have petitioned for the right to set their own standards. The Natural Resources Defense Council, along with California, New York, and several other states have taken DOE to court over its decision to issue a no-standard standard.

Meanwhile, New York put into effect a 9.5 SEER standard for central air conditioners on Sept. 1, 1984, even though the state admits it may not have the resources to enforce the new regulations.

And on Dec. 19, 1984, the California Energy Commission voted 3 to 2 to raise the mandatory minimum SEER level in that state from 8 to 8.9, effective Jan. 1, 1988. A second step, to 9.9, is scheduled to take effect Jan. 1, 1993. CEC also plans to look at the efficiencies of heat pumps, packaged terminal air conditioners, room air conditioners, and commercial air conditioners before the June 30 deadline established by legislation passed a year ago.

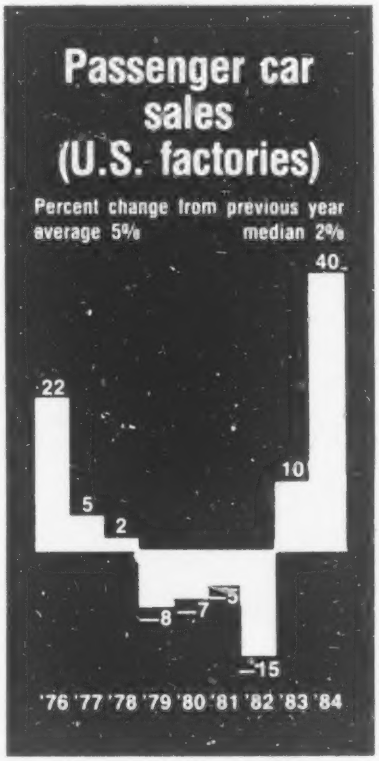
Florida is considering a minimum efficiency standard on top of its state energy code. New Jersey, Oregon, and the Northwest Power Regional Planning Council also have expressed interest in mandatory minimums.

It goes without saying that the prospect of nearly two dozen state minimums is upsetting to most manufacturers, espcially those who offer only one or two efficiency ranges. Because of the relatively large differences in the amount of metal used for heat exchanger surface, for example, the difference in cost for each tenth of an SEER can be large and can exact severe competitive penalties.

Still remaining are the energy labels and fact sheets mandated by the Federal Trade Commission for furnaces, boilers, room air conditioners, and other major appliances. Central air conditioners and heat pumps so far have escaped, primarily we suspect because General Accounting Office studies have shown the labels and fact sheets are not being used by homeowners who buy central equipment.

Still in the wings, but not an immediate threat, is the continuing desire by some within DOE to mandate performance standards for all buildings. Although rejected once by Congress, research in support of this approach is continuing.

Construction contracting volume for 1983 was $166.9 billion in constant 1977 dollars, up 11.8% from $149.3 billion in the previous year. Private construction volume, at $133.5 billion in 1983, was up 15.4% in constant 1977 dollars over the previous year primarily because of the big increase in housing. Nonresidential construction in 1983 totaled $38.3 billion in constant dollars, down 8.5% from $41.9 billion in the previous year.



Passenger car sales (U.S. factories)

Percent change from previous year

average 5% median 2%

For the first ten months of 1984, the $74.5 billion in private nonresidential building construction represented a 22% gain over the $61 billion total for the first ten months of 1983. Both totals are expressed in current rather than constant dollars and represent the value of new construction put in place as counted by the Bureau of the Census.

A comparison of the ten-month periods last year and in 1983 showed that: the $14.1 billion in new industrial construction was 7.85% ahead of the $13.1 billion in 1983; the $25.6 billion in new office construction was 23.6% ahead of the $20.7 billion total in 1983; the $21.8 billion in other commercial construction was 48.4% ahead of the $14.7 billion total for this category in 1983; the $1.54 billion in educational facility construction was 7.6% ahead of the $1.43 billion total for 1983; and the $6.6 billion total for hospital and institutional facilities in the 1984 period was 1% ahead of the $6.5 billion total recorded for the same period a year earlier.

The outlook for 1985, according to

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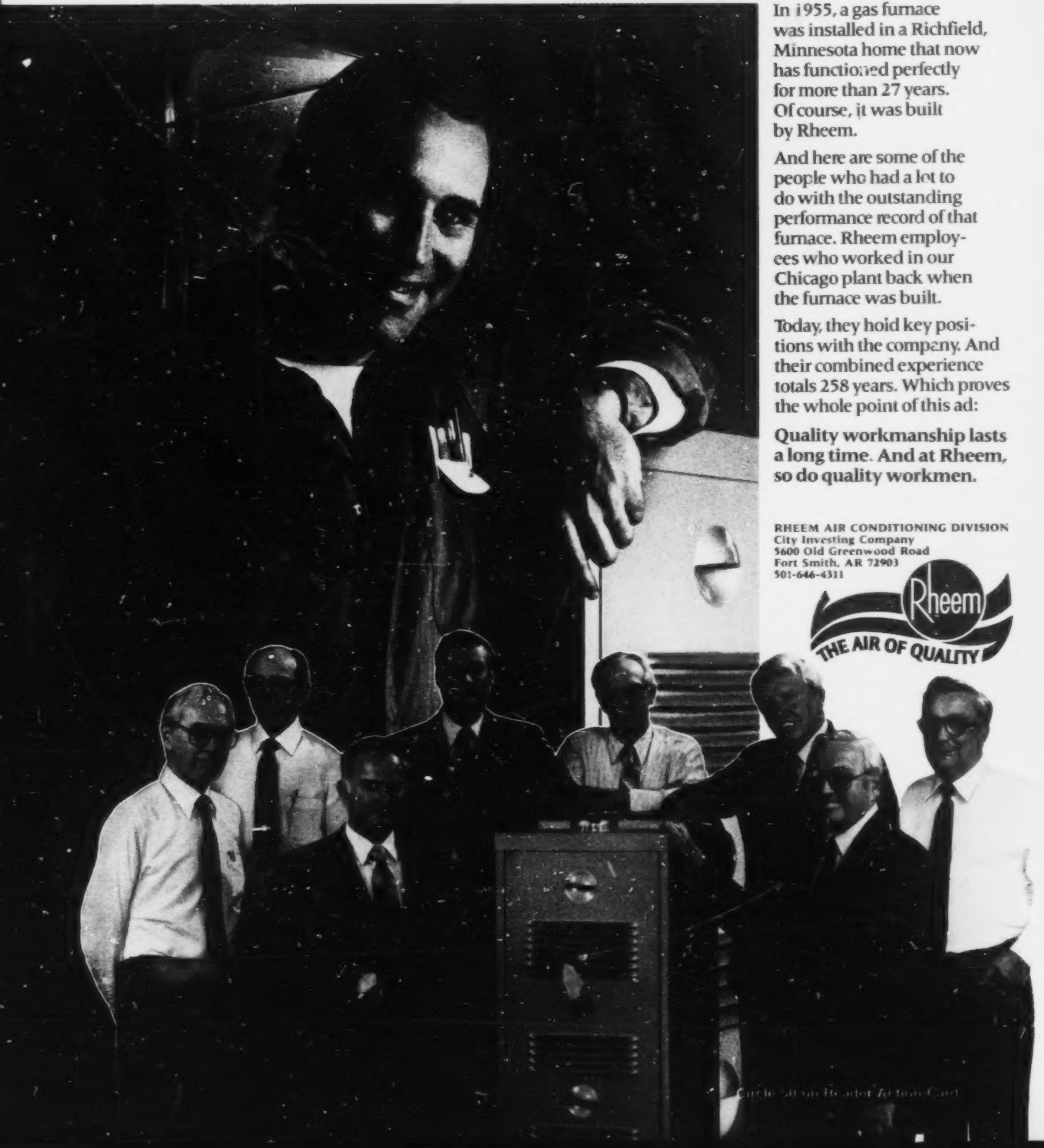

In 1955, a gas furnace was installed in a Richfield, Minnesota home that now has functioned perfectly for more than 27 years. Of course, it was built by Rheem.

And here are some of the people who had a lot to do with the outstanding performance record of that furnace. Rheem employees who worked in our Chicago plant back when the furnace was built.

Today, they hold key positions with the company. And their combined experience totals 258 years. Which proves the whole point of this ad:

Quality workmanship lasts a long time. And at Rheem, so do quality workmen.

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City Investing Company
5600 Old Greenwood Road
Fort Smith, AR 72903
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Rheem
THE AIR OF QUALITY

Circle [illegible] on Reader Action Card

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bidding plans listed by Engineering News-Record, indicates that nonresidential construction should increase by 27% even though bidding for industrial facilities was down by 25%.

Bidding activity for all commercial construction showed a 28% increase early in 1985, including a 40% increase for office buildings and a 36% increase for retail stores and shopping centers. Bidding for educational facilities was up 46%, medical facilities by 10%, and hospitals by 27%.

The big gainer last year was the retail store-shopping center market, which grew by 33% to $4.28 billion. A sure tagalong to gains in residential construction, this category promises continuing strength this year. The leaders include California with a $629.5 million total last year, Florida with $445.5 million, and Texas with $334.4 million.

The economy

Although the current economic expansion is maturing and the leading segments of the recovery, housing and auto production, have peaked, the odds favor slower but continued growth throughout 1985.

There is a growing sentiment that the recovery, which began early in 1983, can be sustained for four or five years provided Federal Reserve Board policies and consumer borrowing don't smother it with overprotective reactions and unrealistic expectations.

Economic forecasters, however, are having trouble with unfamiliar waters that feature massive budget deficits, high and volatile interest rates, an ever-widening trade deficit, and a powerfully overvalued dollar.

But one thing would appear sure. Even if the overall economy continues to grow, albeit at a slower rate than in 1984, it will be even more spotty than last year as the effect of cheap imports and limited exports is reflected in more unemployment and economic disruption.

The U.S. can expect to become a net debtor nation this year. With U.S. investments abroad evaporating, there will no longer be a cushion of repatriated earnings to cushion the merchandise deficit — a factor that could cause the demise of whole industries that are unable to adapt.

The gross national product (GNP), in real terms, moved ahead by 6.7% last year in constant 1972 dollars. This comes after a 3.7% increase in real terms in 1983. Expressed in current dollars, the GNP increased by 10.7% last year to $3.66 trillion. This followed a 7.7% expansion (in current dollars) in 1983.

Looking ahead, we can expect the growth in the GNP in 1985 in real terms to be about half of the growth rate of last year. Although this means there won't be quite as much steam behind the expansion, it also means that it has a better chance of being sustainable.

On the positive side, we can look forward to a fourth year in a row when inflation will hover around the 4% mark. The 4.2% inflation rate of 1984 probably will be followed by a 1985 rate of slightly less than 4%. Back in 1979, the inflation rate was 12.8%.

Even though real U.S. interest rates remain at historically high levels despite subdued inflation rates, it's unlikely there will be anything but a temporary softening in these rates. In fact, the Federal Reserve policy in 1985 would seem to be the same as last year: The pursuit of sustainable real growth while maintaining price stability.

Unsustainable real growth, such as that which occurred in the first and second quarter of 1984, can be expected to produce monetary tightening while a sharp slowdown in growth, such as what happened in the third quarter of last year, is likely to trigger an easing of credit by the Federal Reserve. It should also be noted that it would appear the Federal Reserve is aware it overreacted last year.

With this in mind, it would seem apparent that interest rates in the first quarter of 1985 are being allowed to rise in tune with market demand. Short-term rates have started to show modest increases but the banks have given no indications they plan to increase the prime rate or the rate on loans tied to it. That's likely to come later in the year.

It was a reduction in interest rates, both short- and long-term, that sparked the 1983 expansion in housing and auto sales that, in turn, got the rest of the economy moving. Another major factor was the apparent stability of those rates.

The prime rate charged by banks, which ranged from 14.86% to 18.87% during the 1980-1982 period, dropped to 10.5% early in 1983. The prime rate held steady at about 11% throughout much of 1983 and 1984. It surged to 13% in the third quarter of last year but fell back sharply to 10.5%.

Just as importantly, home mortgage rates dropped from a construction-freezing high of more than 17% in the 1980-1982 period to 13%-13.5% throughout most of 1983 and 12.25% to 12.75% in 1984. Variable rate mortgages, which now constitute more than half of mortgage loans, are running at about 2.25% less than the rate charged for fixed-rate mortgages. There are clear indications that, in terms of sustainable housing construction momentum, mortgage interest rates are at the top of the scale. Even small increases can severely impact overall construction starts and sales.

Looking across the cost-of-living index components, the increases in home owning and renting costs, apparel, and in medical care were compensated to some extent by reductions in transportation, fuel, and home energy costs.

Producer prices for finished goods in 1984 increased over the previous year's experience by only about 2%. The increase for 1983 was only 1.6%. The biggest increases last year came in the food category, with capital goods a distant second.

Unemployment, which stood at 10.6% in December, 1982, has dropped steadily to 7.2% at year's end in 1984. Although total unemployment is expected to drop to just under 7% this year, there are parts of the country — particularly in the Midwest — where unemployment has become chronic.

Total expenditures for new plant and equipment planned in 1985 amounted to $333.4 billion, up 8.4% from the $307.59 billion total for 1984. The total last year was 14.3% ahead of the $269.22 billion in 1983.

Per capita personal disposable income in the third quarter of 1984 was running at a seasonally adjusted annual rate of $11,000, up 9.1% from the same period in 1983. Savings as a percent of disposable income amounted to 6.3% in the third quarter of 1984 and only 5% at the same point in the previous year.

Average weekly earnings, at $296.74 in November, 1984, were 3.6% ahead of the $286.53 total nonagricultural weekly earnings in November, 1983. In November, 1984, nonsupervisory factory workers averaged $376.65 a week, up 3.4% from the previous November; construction workers averaged $459.11, up 4%; and retail trade workers averaged $177.01, up 1.4%.

Air conditioning

The importance of electric utility incentive programs and the steadily increasing replacement market were underlined in 1984 when unitary air conditioning shipments showed a dramatic 24% increase despite only a modest 2.5% gain in private housing starts.

Not to be forgotten either is the fact that, for the first time, unitary air conditioning shipments topped the 3 million mark. And, although this year's total is unlikely to eclipse 1984's performance, we can expect another year in which unitary shipments top 3 million.

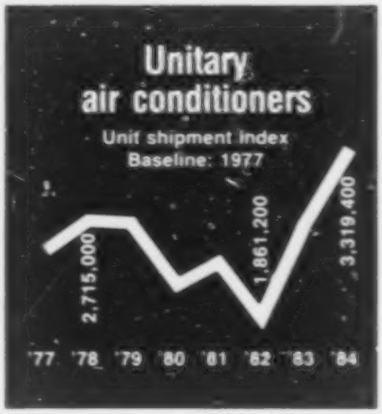
Total shipments of U.S. unitary air conditioners and heat pumps in 1984 increased by 24% to 3,308,428 units from the previous year's more-than-respectable total of 2,668,321 units, according to the Air-Conditioning and Refrigeration Institute (ARI). Last year's total reflected a 78% increase over the recession-prompted 1.86-million total of only two years previous.

These figures do not include air conditioning units and air-to-air heat pumps shipped to foreign markets. Although final figures were not available, shipments to overseas markets through the first 11 months of 1984 were running 29% ahead of 1983. This should produce a year-end total of 98,600 unitary export units. The revised total for 1983 was 76,500 units.

It must be remembered, also, that these export figures include only those units shipped directly to overseas markets by oem's (original equipment manufacturers) and include few, if any, units shipped by distributors or contractors.

Of the 2,668,321 units shipped in 1983, about 80% — or 2,134,657 units — were for residential applications, and 20% — or 533,664 units — were for commercial applications, according to ARI.

This ratio is slightly different than the 78%-22% split that has held sway for the past decade, but in sharp contract to the ratio posted in 1953, the first year for which statistics were available. At that time, 66.9% of total unitary shipments went into commercial installations and only 33.1% went into homes. The residential share passed the commercial portion two years later when it accounted for 56.5% of shipments. The 78%-22% split was first reached in 1973.



If we accept that the 1983 split held true in 1984, then 2,646,742 units — or 80% — were destined for residential applications and 661,686 units — or 20% — were destined for commercial applications.

The unitary category includes electric air conditioners, gas air conditioners, air-to-air heat pumps, and rooftop equipment. It does not include packaged terminal air conditioners (ptac's), packaged terminal heat pumps, room air conditioners, heat pump water heaters (or air-to-water heat pumps), or water-source heat pumps.

Inventory

The inventory of unitary air conditioners at the end of 1984 was 867,462 units. Although this total was 25% higher than the 693,350 units in inventory at the end of 1983, both the 1983 and 1984 inventory totals represented about 26% of total shipments in each of those years. These inventory-to-total shipment ratios were significantly lower than the 30% to 33% range considered normal throughout the industry's history.

This second year with relatively low inventories lends more credence to the theory advanced by some that there has been a major improvement in distribution efficiency within the past two years among both independent wholesaler-distributors and factory branches. Certainly, surveys conducted by The News have not revealed any significant shortages.

It would appear that efficiencies brought on by the relatively high cost of money and by improved forecasting techniques employed by wholesalers, distributors, and manufacturers have had a telling effect on unitary inventory levels. Even if shipments in 1985 should drop by a few percentage points to, say, 3,110,000 units, the inventory level at the start of the year still would only represent about 28% of shipments — or safely under the previous industry norm.

Of the total end-of-1984 inventory, a total of 395,211 units — or 45.6% — were at the factory, and 472,251 units — or 54.4% — were at the distributor level. At the end of 1983, 49% of the inventory was at the factory level, and 51% was at the distributor level.

Capacity mix

An indication of capacity mix for 1984 unitary air conditioners, and how it compares with 1972 experience, follows:

	% 1972	% 1984
Under 1.8 ton	16	13.7
1.8 ton to 26,999 Btuh	23	21.8
2.25 ton to 32,999 Btuh	17	18.1
2.75 ton to 38,999 Btuh	22	20.3
3.25 ton to 43,999 Btuh	6	7.1
3.67 ton to 53,999 Btuh	7	7.5
4.5 ton to 64,999 Btuh	6	7.4
5.4 ton to 96,999 Btuh	1	1.7
8.1 ton and larger	1	2.4

Installed value

The installed value of unitary air conditioning equipment put in place in 1983, the latest year for which figures are available, was $7,125,914,000, up 37% from the $5.204 billion worth installed in 1982, according to ARI's Business Research Department.

Installed value covers the cost of unitary air conditioning equipment as

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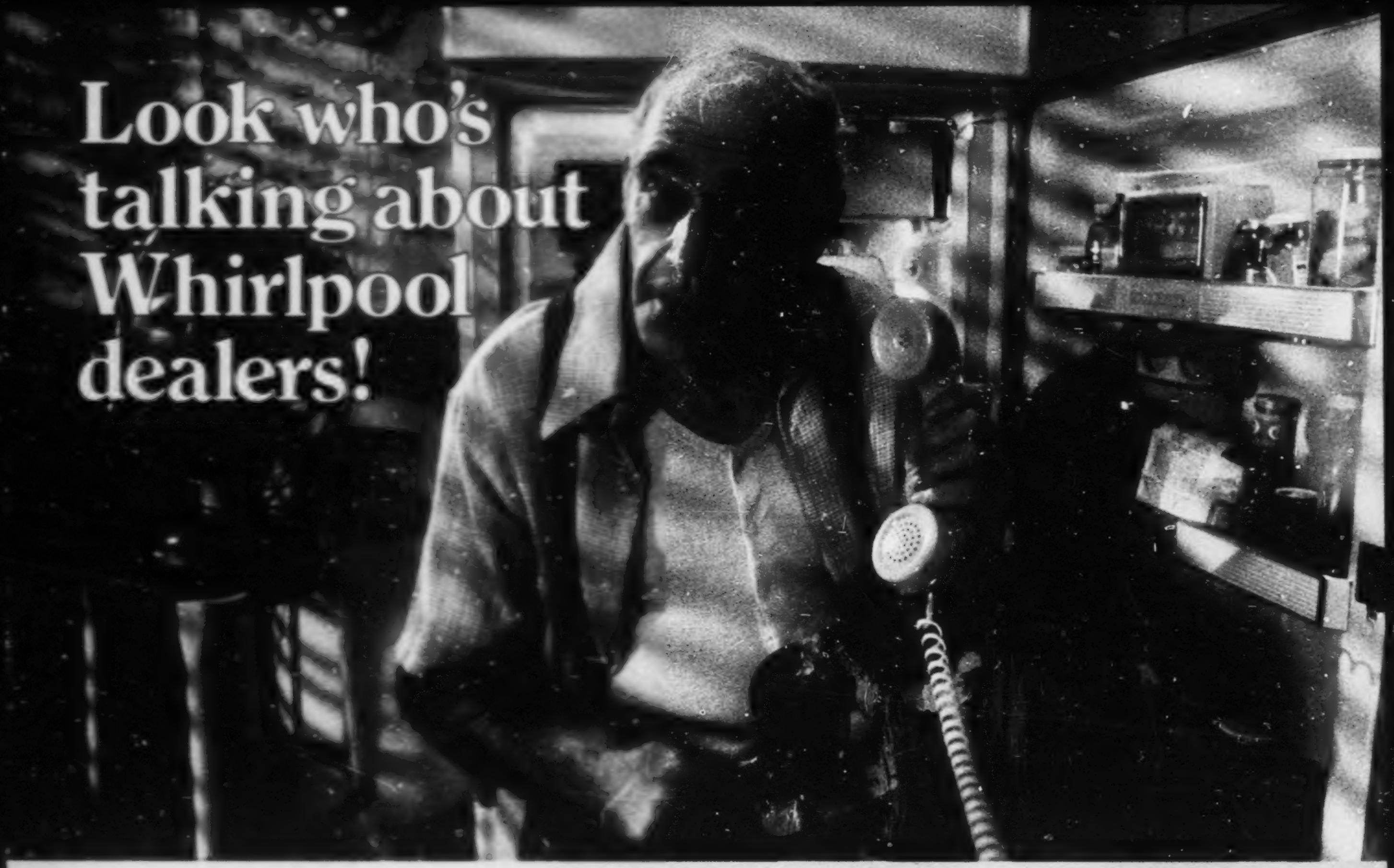
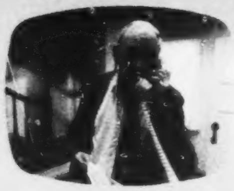


Look who's talking about Whirlpool dealers!

And selling your premium promotion to consumers.

Abe, suffering from a broken down air conditioner, finds that by calling his Whirlpool dealer, he can install dependable, energy-efficient Whirlpool air conditioning and take advantage of the Magnavox stereo offer.



Abe learns that by phoning his nearest Whirlpool dealer, an energy-efficient Whirlpool heat pump can be the ideal solution to help reduce his larger-than-life utility bill.

Abe discovers he can't fix his ailing furnace, but by calling his Whirlpool dealer, he can install an energy-efficient Whirlpool furnace for dependable, worry-free performance.

This state-of-the-art Magnavox Component Stereo System features a built-in turntable, cassette player/recorder, AM/FM radio and dual bass speakers.

Whirlpool is on network television in a big way. With humorous, slice-of-life commercials featuring dependable Whirlpool heating and cooling products and the lovable Abe Vigoda, "FISH" of TV's *Barney Miller.* These commercials will be running on some of the top TV shows, including The *Today Show, Good Morning America, Today at Sunrise, ABC News this Morning, NBC Evening News, Wide World of Sports* and *The Johnny Carson Show.* All advertising the great new Whirlpool Premium promotion featuring the Magnavox Component stereo for a special pre-season price.

In addition to the national spots with Abe, Whirlpool dealers now have a full series of commercials for local use. All featuring the quality Whirlpool line of air conditioners, furnaces and heat pumps. If you're a Whirlpool dealer, get your commercials and start running them. If you're not a Whirlpool dealer, but you would like to know more about becoming one, call your Whirlpool distributor. We're aggressively adding dealers who want to join our HVAC team. *THE BEST NAME IN THE BUSINESS IS GETTING EVEN BETTER.*

Whirlpool
HEATING & COOLING PRODUCTS

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shipped from the factory, together with labor, ductwork, registers and grilles, thermostatic and other controls, electrical wiring, and other components of the system that are installed by contractors.

The installed value of field-engineered air conditioning systems put in place in 1983 was estimated at $4,834,200,000, an increase of 34.1% over the $3,605,533,000 worth put in place a year earlier.

The combination of the two installed value figures for 1983 was $11,960,114,000 for all comfort cooling (with the exception of room air conditioners) put in place in the U.S. This represents a 35.8% increase over the $8,809,533,000 total for 1982.

Comparing dollar values, unitary systems accounted for about 59% of the total in both 1982 and 1983. Similarly, field-engineered systems accounted for about 41% of the total in both years. In 1981, however, unitary systems accounted for 65% of the total dollar value and field-engineered systems accounted for 35%.

In determining the installed value of field-engineered systems, ARI estimates that only 7.5% of the cost of the system is represented by the refrigerating machine. The remaining 92.5% represents air-handling equipment, labor, ducts, pipes, controls, and all other installation costs.

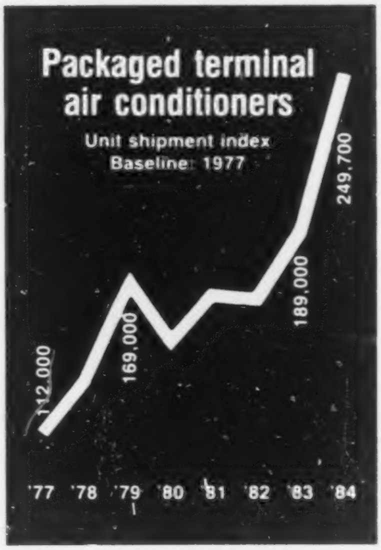
Ptac's

Packaged terminal air conditioner (ptac) shipments have been increasing steadily since 1980, primarily because of the growing strength of heat pump versions and ever-widening applications. Not to be forgotten, either, is the fact that some of the major companies now have ptac products and are no longer selling against the concept.

Total ptac shipments in 1984 were estimated at 249,700 units, up 32% from the year-previous total of 189,000 units. Shipments in 1975 amounted to only 89,000 units.

In keeping with earlier predictions, heat pump versions accounted for about half (52%) of total ptac shipments last year, up from 40% in 1983 and one third a year earlier. It's likely that ptac's without a reverse cycle will continue to decline as a share of total ptac shipments.

The growth of ptac's is a reflection of continuing strength in the suburban office park, nursing home, and hotel-motel markets. Heat pump versions can be found in all of these market areas, particularly in the south, and in the growing number of multifamily housing applications.



It is this multifamily housing strength, plus a healthy carryover in the commercial sector, that leads us to believe this market will increase in 1985 by about 10% to 275,000 units.

It might be noted that the Bureau of the Census reported that 208,826 ptac's were shipped in 1983, the latest year for which figures are available, up 11% from the 188,253 units reported shipped the previous year.

Of the 1983 total, the Census Bureau said 58,753 units — or 28% — were heat pump versions. This was the same percentage share for heat pumps as in 1982. According to the government figures, heat pumps accounted for 32,439 of total ptac's shipped in 1981, or 18.5%. As can be seen, the Census Bureau figures in this category still vary considerably from those collected by industry.

Ptac's are self-contained refrigeration cycles capable of being combined with a heat source such as electric resistance heat, steam, or hot water coils, in the same through-the-wall cabinet. The heat pump version uses outdoor air as a primary heat source and may or may not contain supplementary hydronic or electric resistance heat.

Heat pumps

Air-to-air heat pump shipments, for many years tied almost directly to new home-building performance, appeared to shrug off that alliance in 1984.

Total 1984 heat pump shipments of 745,195 units — the highest total ever for this product — were 18.3% ahead of the 629,776 total for 1983, the previous record holder. Housing, meanwhile, managed only a 2.5% increase.

Despite appearances, however, the link with housing is surely there. The air-to-air heat pump was largely a product applied only in the Deep South until the early 1970's and shipments seldom got above 120,000 units a year. But with natural gas curtailments, heat pump shipments increased steadily to a previous high of 560,000 units in 1978.

Drops in heat pump shipments in 1980 and again in 1982 were directly attributable to a depressed new home market. But even then, the penetration of heat pumps into new single-family homes increased from 24.2% in 1981 to 26.6% in 1982 — and to 28.5% for single-family homes built in each of the past two years.

Although the heat pump replacement market is beginning to show signs of real growth, we think it's the increasing use of heat pumps in the growing multifamily housing market that has accounted for much of the growth percentage above and beyond that of the overall housing market.

The continuing strength of multifamily home construction, plus the fact that more than half of today's new homes are being built in the south, leads us to believe that heat pump shipments in 1985 will decline by only 6% to a still respectable 700,000 units. This forecast reflects a slight increase in multifamily home starts, but an overall decline of 5.4% to 1,650,000 units.

A disappointment among some mar-

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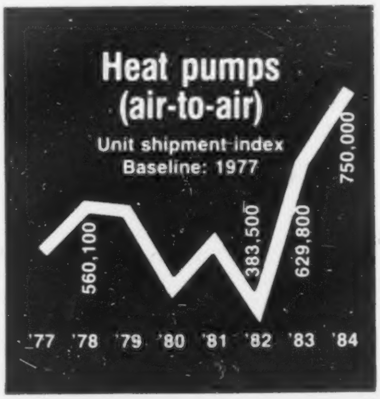


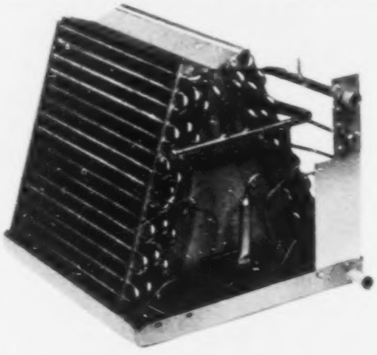
The Flexible Split

Introducing the versatile condensing unit that will fast become the dealer's and distributor's choice, because it can help cut costs by reducing product inventory and saving valuable warehouse space.

You'll have to look far and wide to find a condensing unit that's as flexible as the new "Flexible Split" from Fedders. Sure it's energy efficient (with SEERs up to 10.0) ... economical (it's a *super high* efficiency unit at a *standard* efficiency price) ... and dependable (it features a rugged rotary compressor). More importantly, it gives you the flexibility of operating it with an evaporator blower or coil for whole-house air conditioning ... or with a split room air evaporator for individual room control.

Think of what that can do for your bottom line. You won't have to inventory a condensing unit line that's only right for evaporator blowers ... or coils ... or split room air evaporators. The new Fedders "Flexible Split" will work great with any one of them.

And if you haven't been able to go after jobs where it's not practical or economical to run duct work -- but *quiet,* efficient air conditioning is still demanded -- you'll now be able to offer the Fedders Split Room Air Conditioning System.



That means more sales. More profits. A better bottom line.

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The specific technology required for the production of top-quality refrigeration oils is very similar to the technology used in the manufacture of white mineral oils—an area in which Sonneborn has been the leader for more than 75 years. So you can count on us for the technical support you need.

And, backed by the worldwide resources of Witco (annual sales approximately $1.4 billion), we've made a long-term commitment to this business.

So you can be sure that our high-quality Suniso® oils will be available for many years to come.

Sonneborn Division.

If you need refrigeration oils or information on where to get them, write to: Sonneborn Division, Witco Chemical Corporation, 520 Madison Avenue, New York, NY 10022. Or call 212-605-3912.

Witco

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keters of air-to-air heat pumps has been the sluggish development of the market for add-on heat pumps used in conjunction with new and existing gas- and oil-fired furnaces. We estimate that these installations have been averaging somewhere around 20,000 to 25,000 a year.

It will be interesting to note whether or not the jolt of abnormally cold weather this past winter — particularly in the South — will have any effect on this phenomenon. There were many complaints that back-up electric resistance heating on heat pumps was inadequately sized to handle the low temperatures — complaints that may lead some in the future to pay more attention to both the cost and sizing of back-up heating systems.

The air-to-air heat pump figures included in the unitary totals supplied by ARI do not include all heat pumps made in the U.S. To these should be added ptac's in a heat pump configuration, water-source heat pumps (both earth-coupled and closed loop), air-to-water domestic hot water heat pump water heaters, and room unit heat pumps.

Water-source units

Shipments of water-source heat pumps, which amounted to only about 40,000 units as late as 1977, increased by 46% in 1984 to 133,600 units. The total for 1983 was 91,500 units. If the economy stays reasonably strong through the first three quarters of 1985, we can look for another 15% increase to about 153,600 units.

These units, which first became popular in the Deep South, are being applied in several different ways and, today, are finding their way into northern states and urban applications.

Water-source units are not included in the unitary total (which includes only air-to-air units). Some are used on closed loops coupled to a small boiler and a cooling tower or evaporative condenser to maintain the loop temperature between 60° and 90°F. Others use water from a pond, well, or the ocean at temperatures as low as 45°F.

The fastest growing segment of the market uses closed vertical or horizontal ground loops filled with a heat transfer fluid (usually water and propylene glycol) to provide comfort heating and cooling at high efficiencies. These applications do not have to depend upon the quantity or quality of ground water and, because they can use vertical holes spaced relatively close together, they can be applied in urban areas. Equally important, these systems can be sized for the full design heating load and do not require a back-up heating source.

It must also be said, however, that these systems have a comparatively high first cost and require specialized application knowledge not always found among local contractors.

Heat-pump water heaters

Domestic hot water in U.S. homes traditionally has been heated in natural gas- and electric resistance-fired storage tanks.

A few homes use LPG (liquefied petroleum gas) and oil burners to heat hot water and a few, particularly in the Northeast and Midwest, use a water jacket on gas- and oil-fired boilers.

Instantaneous hot water heaters of the type popular in Europe so far have made little impression on the American market. Instead, increasing energy prices have motivated homeowners to add extra insulation to storage tanks, add solar assist, and to use desuperheaters in areas where the operating hours of air conditioners and heat pumps can justify the cost.

The air-to-water heat pump, with an installation cost more than twice that of an electric water heater, entered the marketplace five years ago with promise of 40% operating cost savings over electricity, natural gas, and oil in selected areas. There were hopes that these units would account for a healthy chunk of the 7 million-unit water heater market — now split evenly between gas and electric resistance heating — but that hasn't happened.

The future of heat pumps generally, however, would appear to be secure. Air-to-air units, which have improved dramatically in both efficiency and reliability in recent years, were used in the 1970's as an alternative to electric resistance heating when natural gas was curtailed. But when natural gas again became almost universally available, the heat pump more than held its ground. Today, heat pumps are being applied in 28.5% of new single-family homes and about a quarter of multi-family units.

The severe weather this winter, particularly in the south, may have given some contractors and homeowners cause to question the amount of back-up electric resistance heating that's provided with the heat pump — or even the possibility of using a split-system heat pump with a conventional furnace.

Rooftops

According to our calculations, commercial rooftop shipments increased by 27.3% in 1984 — a reflection of the continuing strength of the shopping center and retail store expansion. Last year's performance also follows a 20% increase in 1983. We say calculations advisedly because no official sources attempt to classify rooftops.

Commercial rooftops really represent a market application of several different products rather than a single product type that can be identified statistically.

For example, all-year units are identified both byARI and the Bureau of the Census and clearly imply a heating capability. However, both single-package and split-system rooftops, although they may have been shipped (and counted) as cooling-only units, may have a modular heating section added in the field.

Too, heat pumps imply one and usually two methods of heating as well as a cooling capability. Another complicating factor is that small, all-year rooftops are applied in more residential than commercial situations.

The News bases its assessment of the commercial rooftop market on the known number of unitary unit shipments in 1983 and 1984 of 5.4 tons or more, and past ARI ratios of system types by size and by residential and commercial applications. Although not as up to date as we might like, the exercise produces totals within a few percentage points of the latest ARI figures by size of product.

By applying these ratios to ARI's 1983 and 1984 unitary shipment figures, we find there were 661,700 commercial units shipped in 1984, up 24% over the 533,700 commercial units shipped the previous year. We also found that, in 1984:

- 285,900 were split systems, of which 22,500 had capacities in excess of 5 tons.
- 181,500 were all-year single packages, of which 38,700 had capacities in excess of 5 tons.
- 111,100 were cooling-only air conditioners, of which 42,600 had capacities in excess of 5 tons.
- 800 were multizones, all of which had capacities in excess of 5 tons.

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Training programs are another example of our support. Nobody else offers you a broader, more comprehensive, selection. The variety of courses includes sales, marketing, servicing and much more.

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We're always ready to answer questions. Just call your Trane Sales Representative.

We're working on more ways to help you every day. We know if you're successful, we're successful. It takes teamwork to sell a quality product. That attitude has always been an important part of Trane Logic. For more information, call or write Hans Rueschmann, V.P. Distribution Sales: 214-581-3569.

The Trane Dealer Products Group, Tyler, Texas, 75711.

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- 83,000 were heat pumps, of which 29,900 had capacities in excess of 5 tons.

Taken together, 134,500 were commercial rooftops with capacities in excess of 5 tons in 1984. The total is 27% more than the 106,100 commercial rooftops shipped in 1983. The strength of this market, which should continue throughout 1985, comes directly from the growing replacement market and, indirectly, as a result of the retail store growth that followed on the heels of the recovery in housing.

Most manufacturers feel that replacements will account for half of the commercial unitary market within five years — and some would put that ratio as high as 60% of the total market for replacements. This growing replacement segment has the benefit of at least partial insulation from the ups and downs of the economy and of new construction.

Mobile air conditioning

According to Ward's Automotive Reports, there were 7,215,635 factory air conditioning units installed on U.S. domestic automobiles during the 1984 model year, up 40% from the 5,148,731 factory installations made in 1983.

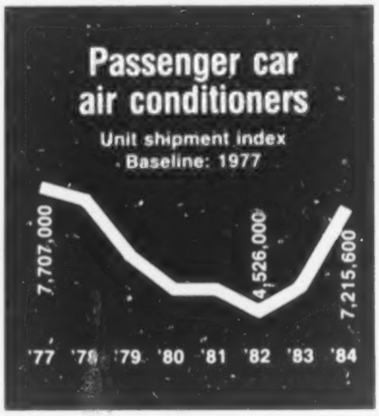
The increase was closely allied to the performance of overall U.S. auto production, which increased from 6,173,538 units in the 1983 model year to 8,588,485 autos last year, or 39%. The difference came from the small shift in auto air conditioner penetration from 83.4% in 1983 to 84% last year.

The penetration of factory air conditioner installations in U.S. automobiles in 1980 was 73%.

For cars made in the U.S., virtually 100% of luxury and full-size autos are air conditioned at the factory. And, as can be seen by the penetration figures, most smaller-sized cars also come equipped with comfort cooling because of the easy availability of factory air conditioners in smaller sizes.

It might also be noted that 1,851,497 of the 3,154,770 light trucks produced in U.S. factories in the 1984 model year were equipped with factory air conditioning. That's an increase of 57.9% over the 1,172,655 air-conditioned light trucks in the 1983 model year. However, light truck production increased by 47.7% from 2,135,984 units in 1983.

Again, the penetration of factory air conditioning in domestic light trucks increased from 54.9% in 1983 to 58.7% in the 1984 model year. Air conditioning penetration in light trucks was only 47.4% in 1982.



Aftermarket shipments of auto air conditioners have been in steady decline since 1978, primarily because of the increasing number of factory-installed units on imports, domestic cars, and off-highway vehicles. Industry observers estimate that Japanese compressors, many of them built in U.S. plants, are being used in more than 80% of aftermarket air conditioners built in the U.S. There also is increasing application of Japanese expansion valves and other components.

Although 1984 figures are not available, the Bureau of the Census reported that 8,423,106 open-type automotive air conditioning compressors were shipped in 1983, up 21.3% from the 6,946,169 compressors shipped a year earlier.

The Census Bureau also reported that 1,556,310 mobile air conditioners for trucks, agricultural, and off-road construction vehicles were shipped in 1983, up 46.2% from the 1,064,381 air conditioners of this type shipped in 1982. Similarly, the Bureau reported that 9,004,192 mobile vehicle air conditioning systems for passenger cars were shipped in 1983, up a whopping 59.3% from the previous year's total of 5,651,329 units.

A three-year-old census category revealed that 156,689 recreational vehicle air conditioners were shipped in 1983, an increase of 10.2% over the 1982 total of 142,227 units.

Room air conditioners

Room air conditioner shipments, which dropped 22.5% in 1983, made a dramatic comeback last year. Shipments in 1984 totaled 3,102,800 units, an increase of 55% over the 2,001,500 units shipped in 1983, but still far short of the more than 4 million units shipped in 1978, according to the Association of Home Appliance Manufacturers (AHAM).

It's unlikely that the experience of the early 1970's, when 5 million plus units were shipped routinely, ever will return. The Japanese succeeded the U.S. as the world's leading exporter of room air conditioners in 1981 and have added to that lead ever since with aggressive marketing, quality equipment, and a hard dollar that has made U.S. products nearly four times as expensive abroad.

Too, a major overseas market of the past — the Middle East — has diminished sharply now that at least two nations there are building their own room air conditioners. Exports of U.S. room units last year totaled only about 150,000 units, down 34% from the 227,200 units exported in 1983. More importantly, exports amounted to only 4.8% of total production in 1984 and only 11.4% a year earlier. For many years, exports accounted for about 25% of total room unit production.

Contrary to earlier expectations, high energy costs have not caused consumers in significant numbers to switch from central air conditioning to the more selective room unit approach. If anything, the reverse has been the case.

Nor has the heat pump phenomenon been evident among room units in the same way that heat pump growth has been noted in the unitary air conditioner and packaged terminal air conditioner product categories. It's esti-

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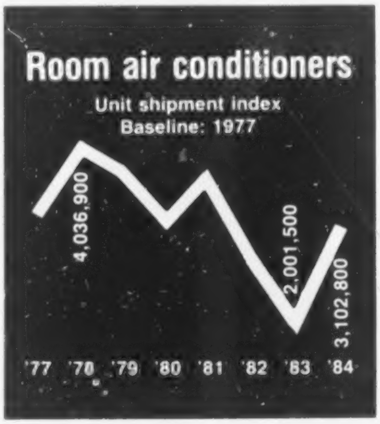

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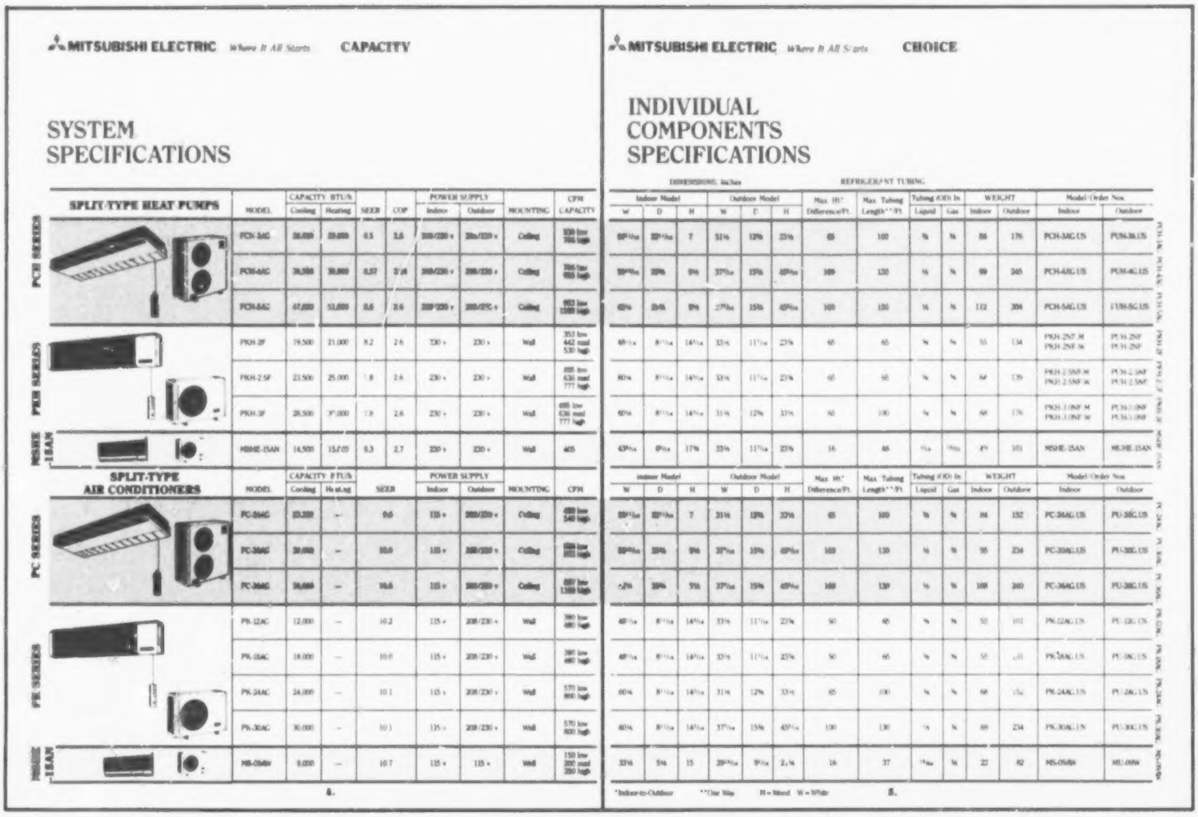

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FROM PAGE 37

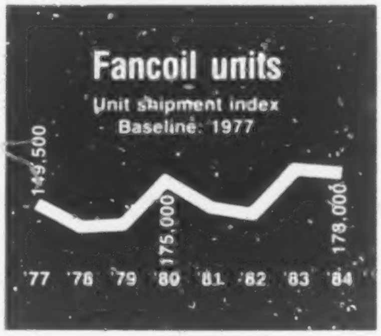
mated that no more than 5% of total room air conditioner production in the U.S. are reverse-cycle units.

Efficiencies, however, are steadily increasing. AHAM reports that more than 55% of the room units produced in the United States last year had EER's (energy efficiency ratios) of 7.5 or more. These units have, however, continued to be primarily an impulse purchase influenced primarily by hot weather.

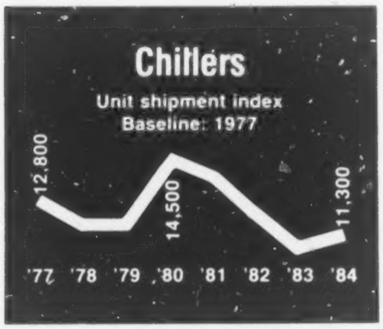
Chillers

Total chiller shipments increased by 4.4% in 1984, from a revised total of 10,740 units in 1983 to 11,210 units last year. Chiller shipments have declined steadily since 1980, due in large measure to the hard dollar that has forced several of the largest U.S. manufacturers to build abroad those chillers destined for foreign markets.

The 2,950 centrifugal chillers shipped in 1984 represents a 4.8% decline from the revised total of 3,100 centrifugal chillers shipped in the previous year. It must be noted also that, since 1982, open type centrifugals have not been included in industry figures, an omission that protects individual manufacturer statistics, but probably reduces the total by 400 or 500 units.



In 1984, there were 8,100 reciprocating chillers shipped, an 8% increase over the revised total of 7,500 chillers shipped in 1983. Shipments of absorption chillers, at 140 units last year, were 14% above the revised total of 140 absorption chillers shipped the previous year.



Each Statistical Panorama includes the latest data available. Sources frequently revise their previous year's figures, which explains apparent discrepancies between the latest and earlier published data. Where sources give significantly varying information, that data is mentioned.

In addition to the decision to build overseas many chillers that, in years past, would have been built in the U.S., it would appear that other abnormalities have crept into the chiller statistics in recent years. We suspect that quite a number of screw compressors used for air conditioning are included in both the centrifugal and reciprocating chiller totals, particularly in the case of Bureau of the Census figures.

For example, the Census Bureau reported that 4,089 centrifugal chillers were shipped in 1983, the latest year for which figures are available. This total is 5% higher than the 3,893 centrifugals the bureau reported shipped in 1982 — but 32% more than the 3,100 units that industry reported shipped in 1983.

Similarly, the Census Bureau reported that 10,543 reciprocating chillers were shipped in 1983, down 9.6% from the 11,668 reciprocating chillers shipped in 1982 — but 40.6% higher than the 1983 reciprocating chiller total reported by industry. The 135 absorption chillers reported by the bureau to have been shipped in 1983, down 32.2% from the previous year, is close to industry totals.

The Census Bureau reported that 3,601 screw compressors were shipped in 1983, an increase of 37.4% over the 2,620 total for the previous year. We suspect, however, that these numbers are low because of the screw compressors we suspect were mistakenly counted as either centrifugal or reciprocating compressors.

The bureau also reported that 1,190 ammonia compressors were shipped in 1983, down 21.1% from the 1,509 units shipped in the previous year.

If we rely on bookings alone, chiller shipments should remain flat in 1985. However, we do not think that expectations for a 5% improvement, to 11,800 units, is at all unreasonable.

A breakdown by chiller type follows:

Year	Recip.	Cent.	Abs
1970	10,300	4,150	1,000
1971	10,000	4,000	900
1972	10,000	3,000	900
1973	10,400	4,100	800
1974	11,000	4,500	1,000
1975	8,250	4,950	700
1976	7,600	3,400	500
1977	8,900	3,000	450
1978	8,100	3,350	370
1979	8,100	3,350	280
1980	9,650	4,600	280
1981	9,250	4,300	240
1982	8,500	3,600	200
1983	7,500	3,100	140
1984	8,100	2,950	160

Evaporative condensers

Shipments of evaporative condensers in 1983, the latest year for which figures are available, amounted to 2,086 units, a 3.7% decline from the total of 2,166 units in 1982, according to the Census Bureau.

Fancoil units

Domestic shipments of fancoil units in 1984 amounted to 178,000 units, down 1.4% from the 180,500 unit total in the previous year.

Bureau of the Census figures, which include exports as well as those units destined for U.S. markets, show that

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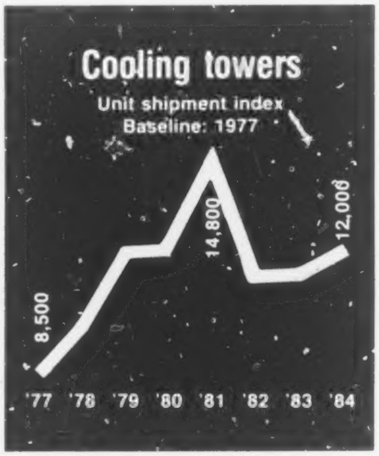

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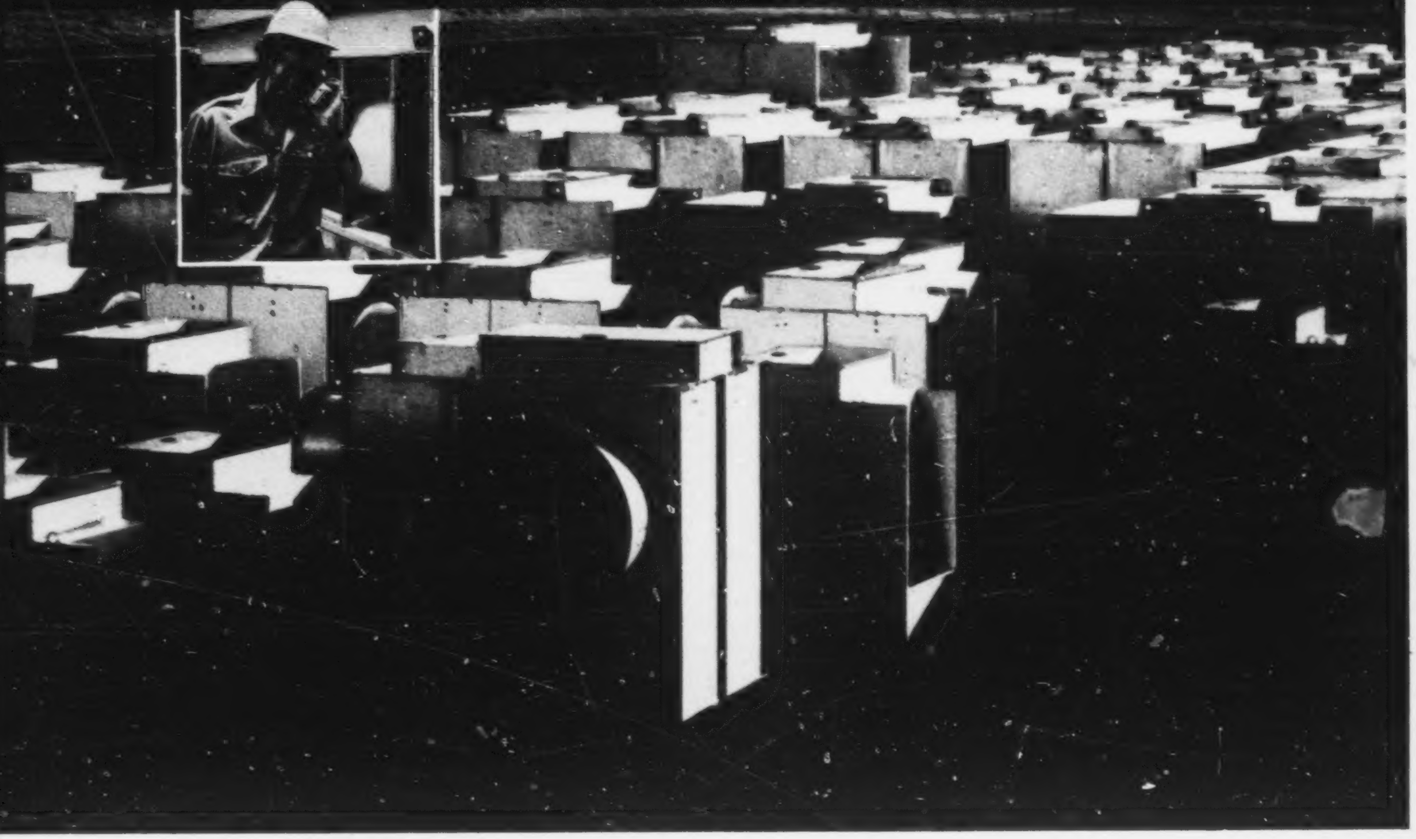

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California leads nation in most home heating-cooling categories

In this section are listed the 50 states (and the District of Columbia) ranked according to their residential heating-cooling equipment and fuel use patterns. Data are taken from the 1980 Census of Population and Housing.

For all-year housing units, of which there are more than 86 million in the U.S., California leads the pack with 9.2 million — more than 10% of the total. (In fact, California shows up in eight of the ten categories shown here.)

Texas has the most housing units with central air conditioning (3 million), followed by Florida (2.4 million) and California (2 million). The top ten states represent more than 13 million homes with central cooling, or more than 50% of the national total of 23.8 million such units.

Homes with one or more room units also total 23.8 million, and their distribution among the states is more diffused. Five of the top ten states are out of the Sunbelt.

Warm air furnaces are the dominant heating equipment in American homes, being found in 42 million housing units. The first five states alone account for more than one-third of the total.

Hydronic home heating systems are predominant in the Northeast region of the U.S., led by New York with 4 million systems. Add the next nine states, and you get 9.3 million hydronically heated homes — or about 63% of the 14.7 million steam or hot water systems in the nation.

Heat pumps, which are found in about 3.1 million homes, are a predominantly Sunbelt phenomenon. Florida leads the list by nearly 6-1 over the number two state, North Carolina.

Natural gas is the predominant home heating fuel, found in nearly 43 million occupied homes, for a 53% saturation. The greatest number of such homes is found in California (7.2 million). Of the top ten states, six are in the Great Lakes region.

Fuel oil and kerosene find their greatest popularity in the Northeast. Among them, four states account for nearly 40% of all such home heating. They are New York (3.3 million homes), Pennsylvania (1.5 million), New Jersey (1.2 million), and Massachusetts (1.1 million).

Nationally, electric heat has the same share as fuel oil and kerosene — about 14.6 million homes, or 17%. Florida has nearly 2.3 million electrically heated homes, followed by Texas and California.

LP gas has about 5% of the national total, and finds its largest market in the South and Southwest, beginning with Florida, which represents nearly 10% of the total.

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All-year housing

Ranking	State	Number of All-year units
1.	**California**	**9,223,120**
2.	**New York**	**6,706,199**
3.	**Texas**	**5,485,273**
4.	**Pennsylvania**	**4,512,674**
5.	**Illinois**	**4,304,425**
6.	**Florida**	**4,278,634**
7.	**Ohio**	**4,078,064**
8.	**Michigan**	**3,450,696**
9.	**New Jersey**	**2,690,371**
10.	**North Carolina**	**2,224,196**
11.	Massachusetts	2,141,364
12.	Indiana	2,065,115
13.	Georgia	2,013,839
14.	Virginia	2,000,075
15.	Missouri	1,962,576
16.	Wisconsin	1,756,311
17.	Tennessee	1,737,123
18.	Washington	1,651,680
19.	Maryland	1,549,680
20.	Louisiana	1,537,183
21.	Minnesota	1,530,293
22.	Alabama	1,450,755
23.	Kentucky	1,355,434
24.	South Carolina	1,222,927
25.	Oklahoma	1,229,522
26.	Colorado	1,169,574
27.	Connecticut	1,144,520
28.	Iowa	1,121,314
29.	Arizona	1,071,787
30.	Oregon	1,071,613
31.	Kansas	950,511
32.	Mississippi	904,523
33.	Arkansas	889,193
34.	West Virginia	737,033
35.	Nebraska	618,833
36.	New Mexico	493,489
37.	Utah	481,066
38.	Maine	428,245
39.	Rhode Island	362,918
40.	Idaho	360,031
41.	New Hampshire	349,172
42.	Nevada	337,649
43.	Hawaii	322,205
44.	Montana	315,098
45.	Dist. of Columbia	276,857
46.	South Dakota	269,644
47.	North Dakota	252,749
48.	Delaware	230,301
49.	Vermont	196,459
50.	Wyoming	182,347
51.	Alaska	152,898

Central cooling

Ranking	State	Number of housing units with
1.	**Texas**	**3,016,026**
2.	**Florida**	**2,398,912**
3.	**California**	**2,084,383**
4.	**Illinois**	**1,351,198**
5.	**Ohio**	**890,581**
6.	**Missouri**	**808,165**
7.	**Georgia**	**805,138**
8.	**Virginia**	**766,239**
9.	**Louisiana**	**704,217**
10.	**North Carolina**	**679,748**
11.	Arizona	674,341
12.	Maryland	667,173
13.	Indiana	624,767
14.	Tennessee	574,134
15.	Oklahoma	558,785
16.	Pennsylvania	538,957
17.	Alabama	531,171
18.	New Jersey	510,918
19.	Michigan	484,492
20.	New York	481,370
21.	Kansas	430,288
22.	South Carolina	406,845
23.	Kentucky	396,381
24.	Iowa	371,600
25.	Arkansas	346,018
26.	Mississippi	307,292
27.	Nebraska	296,004
28.	Minnesota	285,959
29.	Wisconsin	216,067
30.	New Mexico	209,278
31.	Nevada	186,369
32.	Colorado	178,967
33.	Utah	150,118
34.	Washington	111,365
35.	Massachusetts	109,369
36.	West Virginia	102,761
37.	Dist. of Columbia	91,547
38.	Connecticut	86,997
39.	Oregon	85,188
40.	Delaware	70,712
41.	South Dakota	65,353
42.	Idaho	59,832
43.	North Dakota	34,177
44.	Montana	25,316
45.	Hawaii	19,340
46.	Rhode Island	12,823
47.	Wyoming	12,714
48.	New Hampshire	8,355
49.	Maine	2,954
50.	Vermont	1,385
51.	Alaska	961

Room units

Ranking	State	Number of housing units with
1.	**New York**	**2,275,012**
2.	**California**	**1,612,712**
3.	**Texas**	**1,550,104**
4.	**Illinois**	**1,503,281**
5.	**Pennsylvania**	**1,328,313**
6.	**New Jersey**	**1,230,243**
7.	**Florida**	**1,193,911**
8.	**Ohio**	**1,040,844**
9.	**Tennessee**	**711,465**
10.	**Michigan**	**697,770**
11.	Massachusetts	681,139
12.	North Carolina	646,497
13.	Indiana	585,340
14.	Missouri	568,375
15.	Louisiana	558,712
16.	Virginia	529,975
17.	Georgia	523,578
18.	Alabama	488,164
19.	Minnesota	459,823
20.	Connecticut	445,617
21.	Oklahoma	443,443
22.	Wisconsin	441,332
23.	Kentucky	440,511
24.	Maryland	418,753
25.	Iowa	368,322
26.	South Carolina	356,962
27.	Mississippi	324,799
28.	Kansas	315,040
29.	Arkansas	288,213
30.	West Virginia	180,727
31.	Nebraska	180,501
32.	Colorado	180,032
33.	Washington	133,124
34.	Oregon	116,607
35.	Rhode Island	101,749
36.	Dist. of Columbia	94,244
37.	South Dakota	91,222
38.	Arizona	87,667
39.	New Mexico	86,606
40.	Utah	84,578
41.	Delaware	78,100
42.	New Hampshire	76,343
43.	North Dakota	67,386
44.	Idaho	56,681
45.	Nevada	49,496
46.	Maine	42,411
47.	Hawaii	40,931
48.	Montana	36,854
49.	Wyoming	23,406
50.	Vermont	17,408
51.	Alaska	361

Warm air furnace

Ranking	State	Number of housing units with
1.	**California**	**4,331,330**
2.	**Texas**	**3,052,213**
3.	**Ohio**	**2,782,931**
4.	**Illinois**	**2,525,286**
5.	**Michigan**	**2,459,239**
6.	**Pennsylvania**	**2,048,342**
7.	**New York**	**1,777,272**
8.	**Florida**	**1,758,676**
9.	**Indiana**	**1,365,262**
10.	**Missouri**	**1,253,738**
11.	Wisconsin	1,161,278
12.	Georgia	1,026,323
13.	North Carolina	918,978
14.	Minnesota	913,763
15.	New Jersey	897,444
16.	Maryland	852,480
17.	Virginia	829,899
18.	Iowa	817,416
19.	Louisiana	779,609
20.	Colorado	748,684
21.	Washington	677,657
22.	Arizona	637,270
23.	Kentucky	626,497
24.	Kansas	622,027
25.	Oklahoma	617,047
26.	Alabama	575,495
27.	Massachusetts	529,912
28.	Tennessee	526,908
29.	Nebraska	459,084
30.	South Carolina	448,466
31.	Oregon	400,755
32.	Arkansas	396,323
33.	Utah	372,056
34.	Mississippi	342,301
35.	West Virginia	307,870
36.	Connecticut	306,353
37.	New Mexico	263,748
38.	Nevada	209,167
39.	Montana	158,567
40.	South Dakota	156,616
41.	Idaho	154,358
42.	North Dakota	144,519
43.	Maine	126,700
44.	Delaware	121,478
45.	Wyoming	107,154
46.	Dist. of Columbia	97,780
47.	New Hampshire	97,106
48.	Rhode Island	69,754
49.	Vermont	63,951
50.	Alaska	35,013
51.	Hawaii	1,372

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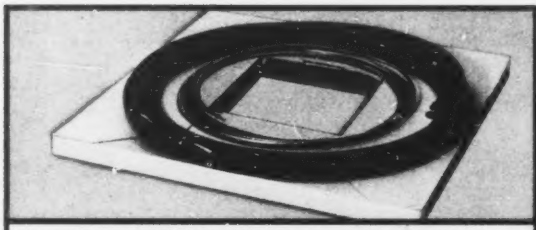

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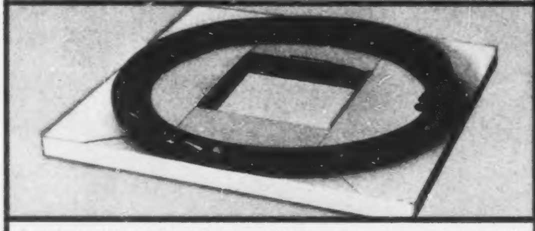

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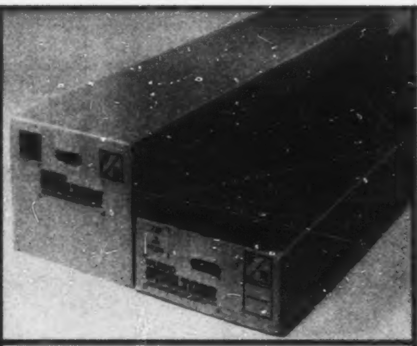

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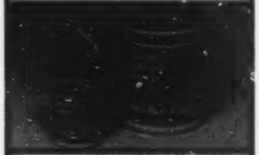

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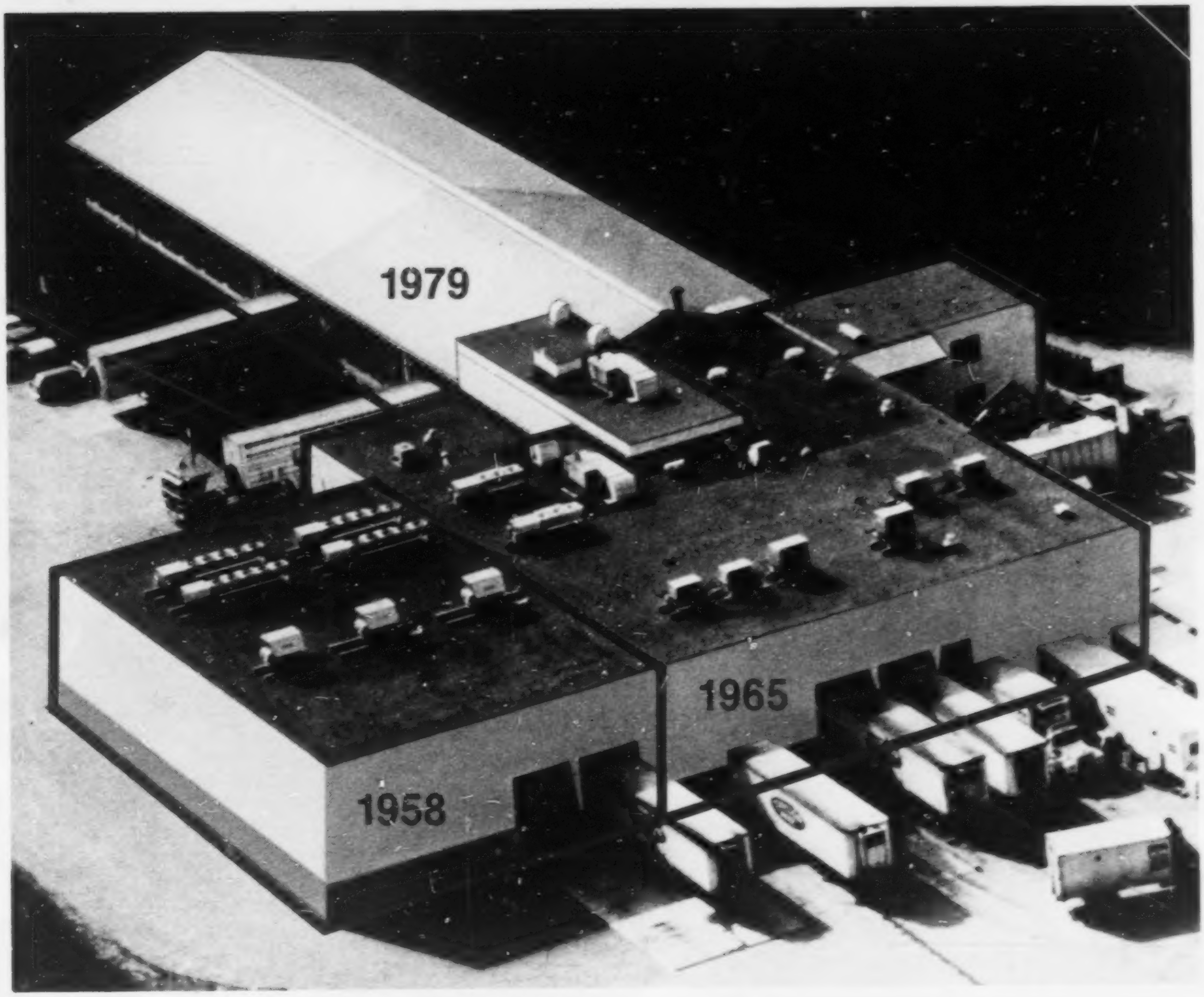

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Kramer outdoor, air-cooled systems are available from ¾ through 100HP to provide unlimited refrigeration capacity, for all industrial and commercial applications, from −30° to +80°F. You also have a choice of ultra-fast Thermobank-2* re-evaporative hot gas, Power-Trim* electric or air defrosts.

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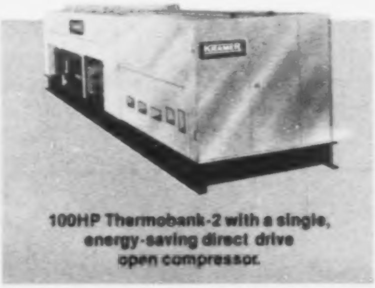

100HP Thermobank-2 with a single, energy-saving direct drive open compressor.

*TRADEMARK OF KRAMER TRENTON CO.

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REFRIGERATION
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Hydronics

Ranking	State	Number of housing units with
1.	**New York**	**4,075,707**
2.	**Pennsylvania**	**1,594,212**
3.	**New Jersey**	**1,392,183**
4.	**Massachusetts**	**1,169,570**
5.	**Illinois**	**1,079,362**
6.	**Connecticut**	**603,060**
7.	**Michigan**	**468,613**
8.	**Ohio**	**438,410**
9.	**Maryland**	**360,008**
10.	**Minnesota**	**356,577**
11.	California	303,505
12.	Wisconsin	292,911
13.	Virginia	271,122
14.	Rhode Island	215,680
15.	Colorado	201,655
16.	Indiana	160,537
17.	Maine	158,753
18.	Missouri	152,523
19.	New Hampshire	135,794
20.	Dist. of Columbia	133,700
21.	Iowa	107,029
22.	Texas	81,700
23.	Washington	81,659
24.	North Carolina	73,743
25.	Florida	73,281
26.	Alaska	64,903
27.	Vermont	59,234
28.	Kentucky	54,008
29.	Delaware	50,863
30.	West Virginia	43,449
31.	North Dakota	42,870
32.	Georgia	39,723
33.	Oregon	35,396
34.	Nebraska	34,204
35.	Montana	34,062
36.	Kansas	32,263
37.	Tennessee	30,545
38.	Louisiana	30,151
39.	South Dakota	42,870
40.	Utah	22,754
41.	Wyoming	20,771
42.	Alabama	19,632
43.	Hawaii	15,293
44.	Arizona	15,122
45.	South Carolina	12,775
46.	New Mexico	12,231
47.	Oklahoma	10,520
48.	Mississippi	9,379
49.	Nevada	9,243
50.	Idaho	8,439
51.	Arkansas	6,677

Heat pumps

Ranking	State	Number of housing units with
1.	**Florida**	**647,518**
2.	**North Carolina**	**199,157**
3.	**California**	**168,892**
4.	**Arizona**	**159,781**
5.	**Texas**	**158,495**
6.	**Virginia**	**153,211**
7.	**Ohio**	**151,101**
8.	**Tennessee**	**140,516**
9.	**South Carolina**	**127,629**
10.	**Alabama**	**103,089**
11.	Georgia	88,123
12.	Pennsylvania	84,147
13.	Kentucky	79,670
14.	Maryland	70,029
15.	Indiana	66,318
16.	Illinois	65,085
17.	Washington	61,878
18.	New York	51,456
19.	Oregon	44,746
20.	New Jersey	39,885
21.	Missouri	35,902
22.	Louisiana	35,318
23.	Nevada	33,761
24.	Mississippi	32,801
25.	Massachusetts	30,635
26.	Arkansas	28,866
27.	Oklahoma	25,819
28.	Michigan	24,744
29.	Iowa	21,519
30.	West Virginia	20,612
31.	Wisconsin	19,693
32.	Idaho	19,172
33.	Connecticut	18,782
34.	Colorado	17,246
35.	Minnesota	16,920
36.	Kansas	13,704
37.	Nebraska	11,420
38.	South Dakota	8,699
39.	Utah	7,766
40.	North Dakota	7,101
41.	Dist. of Columbia	6,953
42.	New Mexico	6,103
43.	Delaware	5,843
44.	Montana	5,057
45.	New Hampshire	4,975
46.	Maine	4,845
47.	Hawaii	3,436
48.	Alaska	3,424
49.	Rhode Island	3,088
50.	Wyoming	2,940
51.	Vermont	1,974

Gas

Ranking	State	Number of housing units with
1.	**California**	**7,235,475**
2.	**Illinois**	**3,262,803**
3.	**Texas**	**3,125,004**
4.	**Ohio**	**2,721,906**
5.	**New York**	**2,488,932**
6.	**Michigan**	**2,430,003**
7.	**Pennsylvania**	**2,062,671**
8.	**Indiana**	**1,173,561**
9.	**Missouri**	**1,165,209**
10.	**New Jersey**	**1,126,224**
11.	Georgia	1,043,506
12.	Louisiana	974,101
13.	Wisconsin	945,092
14.	Colorado	867,220
15.	Minnesota	857,633
16.	Oklahoma	777,013
17.	Kansas	685,012
18.	Iowa	682,109
19.	Maryland	671,966
20.	Massachusetts	666,435
21.	Kentucky	640,280
22.	Alabama	639,861
23.	Arizona	543,440
24.	Virginia	528,677
25.	Arkansas	472,446
26.	Tennessee	460,937
27.	Florida	421,575
28.	Nebraska	410,378
29.	West Virginia	407,477
30.	Mississippi	380,845
31.	Utah	362,961
32.	Washington	341,204
33.	New Mexico	328,332
34.	North Carolina	327,370
35.	South Carolina	266,137
36.	Connecticut	236,166
37.	Oregon	223,456
38.	Montana	172,866
39.	Nevada	145,656
40.	Dist. of Columbia	145,411
41.	Wyoming	121,570
42.	Rhode Island	109,321
43.	South Dakota	101,666
44.	North Dakota	91,786
45.	Idaho	86,537
46.	Delaware	58,285
47.	Alaska	46,970
48.	New Hampshire	38,177
49.	Hawaii	12,131
50.	Vermont	10,709
51.	Maine	5,731

Fuel oil/kerosene

Ranking	State	Number of housing units with
1.	**New York**	**3,291,760**
2.	**Pennsylvania**	**1,458,870**
3.	**New Jersey**	**1,171,795**
4.	**Massachusetts**	**1,097,630**
5.	**North Carolina**	**819,883**
6.	**Connecticut**	**698,056**
7.	**Virginia**	**633,466**
8.	**Maryland**	**527,837**
9.	**Wisconsin**	**425,622**
10.	**Florida**	**422,796**
11.	Ohio	415,199
12.	Michigan	409,969
13.	Minnesota	325,873
14.	Washington	425,622
15.	Maine	281,648
16.	Indiana	256,803
17.	South Carolina	252,077
18.	Illinois	214,759
19.	Rhode Island	193,576
20.	New Hampshire	193,367
21.	Oregon	186,438
22.	Iowa	115,393
23.	Delaware	114,595
24.	Vermont	108,706
25.	Kentucky	82,980
26.	Dist. of Columbia	76,014
27.	West Virginia	68,690
28.	North Dakota	63,432
29.	Missouri	62,512
30.	Tennessee	62,470
31.	South Dakota	53,732
32.	Idaho	52,773
33.	Alaska	50,295
34.	Georgia	34,846
35.	Nebraska	27,341
36.	Nevada	21,123
37.	Montana	19,144
38.	Utah	11,132
39.	California	8,086
40.	Alabama	7,018
41.	Texas	6,491
42.	Colorado	6,038
43.	Kansas	5,341
44.	Arizona	1,984
45.	Mississippi	1,819
46.	Louisiana	1,784
47.	New Mexico	1,692
48.	Wyoming	1,620
49.	Arkansas	1,217
50.	Hawaii	984
51.	Oklahoma	961

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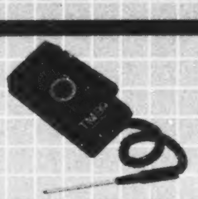

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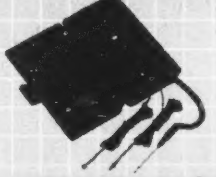

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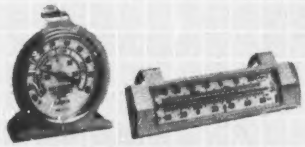

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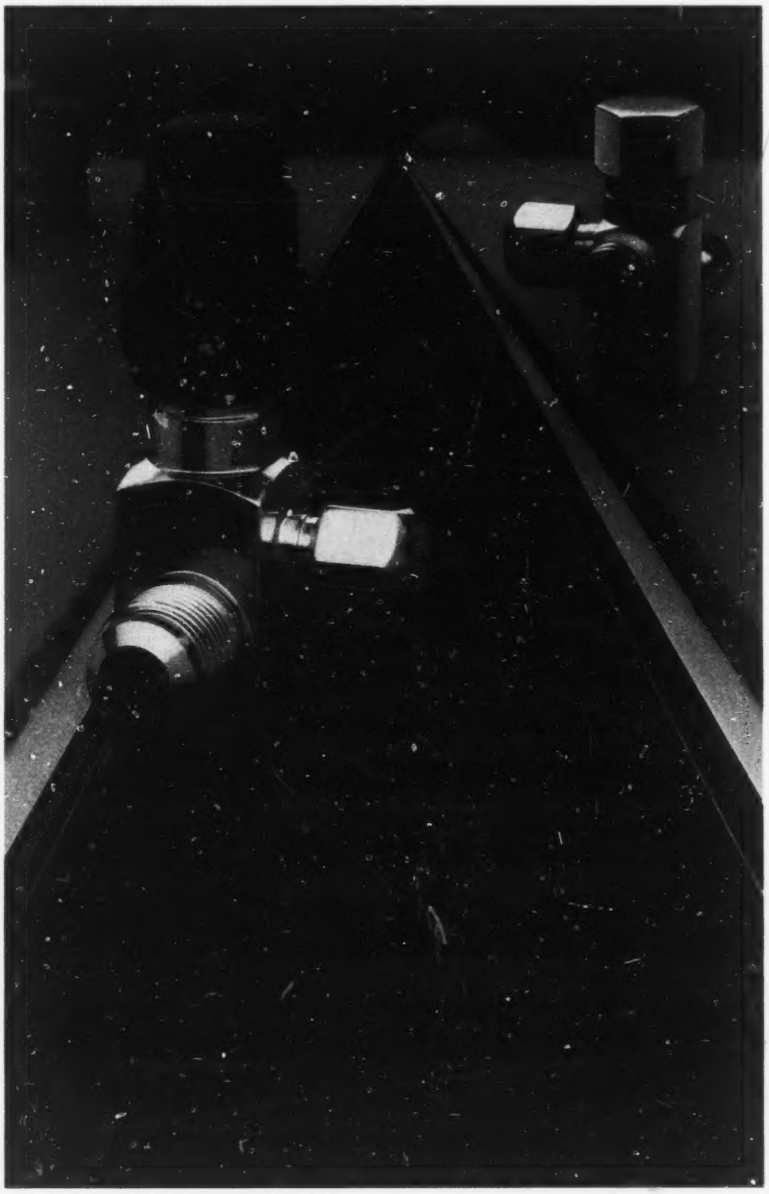

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Bluffton, Indiana 46714

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Electric heating

Ranking	State	Number of housing units with
1.	**Florida**	**2,265,225**
2.	**Texas**	**1,274,798**
3.	**California**	**1,041,928**
4.	**Washington**	**808,605**
5.	**Tennessee**	**793,882**
6.	**North Carolina**	**598,625**
7.	**Virginia**	**500,423**
8.	**Ohio**	**497,173**
9.	**Oregon**	**434,173**
10.	**Pennsylvania**	**432,714**
11.	Georgia	371,357
12.	Alabama	346,994
13.	Illinois	341,182
14.	Arizona	327,075
15.	New York	320,991
16.	South Carolina	319,982
17.	Indiana	315,671
18.	Louisiana	313,442
19.	Kentucky	293,229
20.	Missouri	210,714
21.	Maryland	201,641
22.	New Jersey	201,403
23.	Massachusetts	194,829
24.	Mississippi	190,092
25.	Oklahoma	181,836
26.	Michigan	149,262
27.	Arkansas	127,370
28.	Idaho	126,836
29.	West Virginia	125,670
30.	Connecticut	117,164
31.	Nevada	110,043
32.	Wisconsin	101,489
33.	Minnesota	101,258
34.	Colorado	100,723
35.	Iowa	87,695
36.	Kansas	79,928
37.	Nebraska	55,410
38.	Utah	45,896
39.	New Hampshire	43,256
40.	Maine	42,052
41.	Montana	41,423
42.	North Dakota	39,881
43.	New Mexico	35,864
44.	South Dakota	35,192
45.	Dist. of Columbia	25,809
46.	Rhode Island	23,386
47.	Delaware	23,214
48.	Alaska	18,984
49.	Wyoming	18,868
50.	Vermont	17,922
51.	Hawaii	13,147

LP gas

Ranking	State	Number of housing units with
1.	**Florida**	**448,262**
2.	**California**	**184,120**
3.	**Texas**	**431,361**
4.	**Georgia**	**318,357**
5.	**Missouri**	**256,989**
6.	**Alabama**	**231,621**
7.	**Mississippi**	**175,926**
8.	**Illinois**	**174,077**
9.	**Iowa**	**147,104**
10.	**Wisconsin**	**130,476**
11.	Arkansas	128,866
12.	Michigan	125,609
13.	Indiana	121,829
14.	South Carolina	118,170
15.	North Carolina	117,909
16.	Oklahoma	106,912
17.	Minnesota	105,689
18.	Ohio	105,461
19.	Kentucky	98,999
20.	Louisiana	96,526
21.	Kansas	84,193
22.	New York	81,808
23.	Tennessee	79,184
24.	Nebraska	68,819
25.	Colorado	56,296
26.	New Mexico	46,290
27.	South Dakota	43,641
28.	Arizona	43,616
29.	Pennsylvania	41,357
30.	Virginia	31,019
31.	North Dakota	26,006
32.	Massachusetts	24,413
33.	New Jersey	24,081
34.	Maryland	22,140
35.	Montana	21,055
36.	Nevada	18,900
37.	Oregon	18,818
38.	Washington	17,685
39.	West Virginia	16,915
40.	Wyoming	15,945
41.	Connecticut	13,238
42.	Idaho	11,866
43.	Utah	10,911
44.	New Hampshire	9,542
45.	Vermont	8,820
46.	Delaware	6,200
47.	Maine	4,589
48.	Rhode Island	4,259
49.	Dist. of Columbia	3,613
50.	Hawaii	3,441
51.	Alaska	1,874

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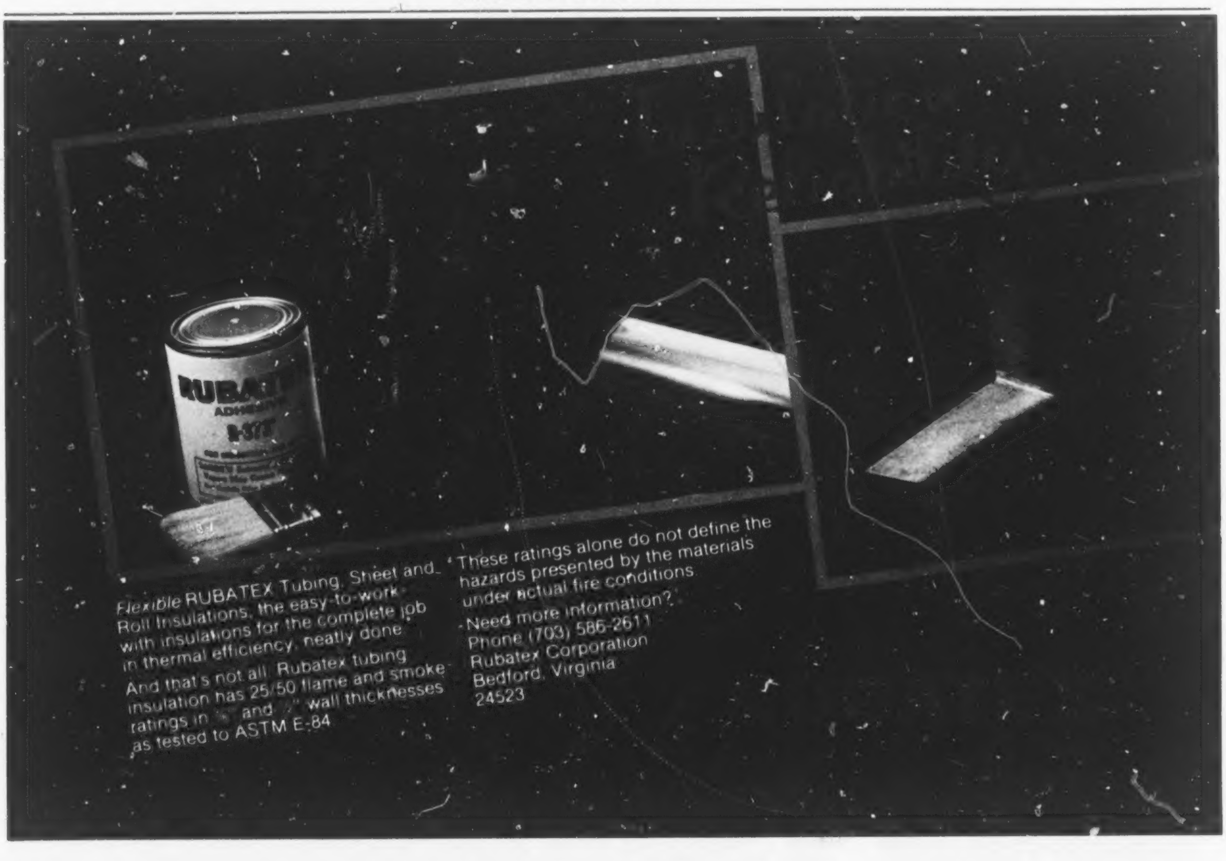

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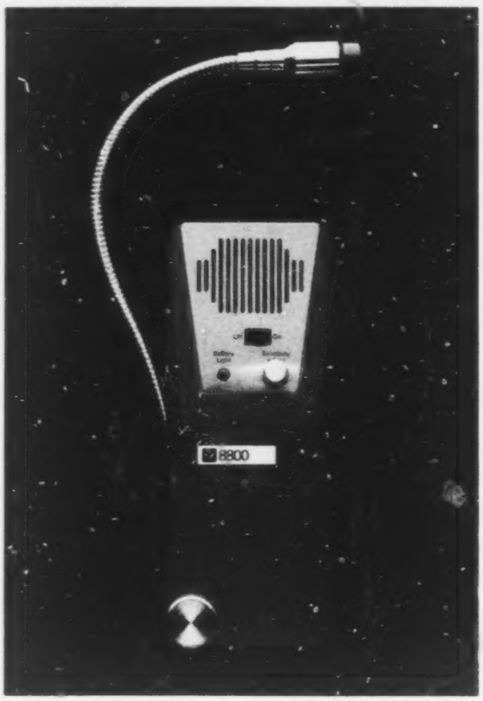

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Circle 69 on Reader Action Card

Tracking heating-cooling data on 105 medium and small cities

With this listing of 105 medium and small markets, we complete the listing of Standard Metropolitan Statistical Areas (SMSAs) that was begun with the 188 larger markets described in last year's Statistical Panorama.

Data on heating-cooling equipment and fuel use are taken from the 1980 Census of Population and Housing.

Generally, fuel use patterns are the same for these smaller markets. Natural gas finds its greatest markets in the midwest and plains states, as well as in California and Texas. Electricity is very strong in the South and Northwest, while fuel oil is still potent in the Northeast.

Saturation of central air conditioning also remains essentially the same for smaller markets, depending on the climate. Although not detailed here, Census data also show that the 22 million rural housing units have a 17% saturation of central air conditioning.

Fuel use for home heating in rural homes is more evenly divided among the three major fuels. Natural gas has a 21% share, electricity has a 19% share, and fuel oil has a 22% share. In addition, LP gas has a 16% share, and wood a 9% penetration.

Alphabetical listing of cities

Abilene, Tex. 82
Alexandria, La. 67
Altoona, Pa. 81

Bangor, Maine 67
Battle Creek, Mich. 68
Bay City, Mich. 68
Bellingham, Wash. 88
Benton Harbor, Mich. 68
Bismarck, N. D. 79
Bloomington, Ill. 63
Bradenton, Fla. 60
Bremerton, Wash. 88
Bryan, Tex. 85
Burlington, N. C. 77

Charlottesville, Va. 87
Chico, Calif. 56
Columbia, Mo. 70

Danbury, Conn. 59
Daytona Beach, Fla. 60
Decatur, Ill. 63
Dubuque, Iowa 65

Eau Claire, Wisc. 90
Elkhart, Ind. 63
Elmira, N.Y. 75
Enid, Okla. 81

Fargo, N. D. 79
Fitchburg, Mass. 68

Florence, S. C. 82
Fort Collins, Colo. 59
Fort Meyers, Fla. 60

Glen Falls, N. Y. 75
Grand Forks, N. D. 79
Great Falls, Mont. 70
Greeley, Colo. 59

Hagerstown, Md. 67
Hickory, N. C. 77
Huntsville, Ala. 56

Iowa City, Iowa 65

Jacksonville, N. C. 77
Janesville, Wisc. 90
Johnson City, Tenn. 82
Joplin, Mo. 70

Killeen, Tex. 85

LaCrosse, Wisc. 90
Lafayette, La. 67
Lakeland, Fla. 60
Laredo, Tex. 85
Las Cruces, N. M. 73
Lawrence, Kan. 65
Lawton, Okla. 81
Lewiston, Maine 67
Long Beach, N. J. 73

Longview, Tex. 85

Mansfield, Ohio 79
Medford, Ore. 81
Melbourne, Fla. 60
Midland, Tex. 85
Missoula, Mont. 73
Mobile, Ala. 56
Monroe, La. 67
Montgomery, Ala. 56
Muncie, Ind. 63

Nashua, N. H. 73
Nassau-Suffolk, N. Y. 77
Newark, Ohio 79
New Brunswick, N. J. 73
Newburgh, N. Y. 77
Norwalk, Conn. 59

Ocala, Fla. 60
Odessa, Tex. 85
Olympia, Wash. 88
Owensboro, Ky. 65

Pascagoula, Miss. 70
Petersburg, Va. 88
Pittsfield, Mass. 66
Poughkeepsie, N. Y. 77
Pueblo, Colo. 59

Racine, Wisc. 90
Rapid City, S. D. 82

Richland, Wash. 88
Riverside, Calif. 56
Rochester, Minn. 68
Rock Hill, S. C. 82

St. Cloud, Minn. 70
St. Joseph, Mo. 70
Salisbury, N. C. 79
San Angelo, Tex. 87
Santa Cruz, Calif. 59
Santa Fe, N. M. 75
Sarasota, Fla. 63
Sharon, Pa. 81
Sheboygan, Wisc. 90
Sherman, Tex. 87
Sioux City, Iowa 65
State College, Pa. 81

Tyler, Tex. 87

Victoria, Tex. 87
Vineland, N. J. 73

Waterloo, Iowa 65
Wausau, Wisc. 90
West Palm Beach, Fla. 63
Wichita Falls, Tex. 87
Williamsport, Pa. 82

Yakima, Wash. 88
Yuma, Ariz. 56

Alabama - California

Huntsville, Ala.

Housing units	113,185
Central cooling	43%
Room units	38%

Home heating system

Warm air furnace	34%
Hydronic	—
Heat pump	15%
Built-in electric	17%
Floor, wall furnace	—
Room heaters	14%
Other/none	8%

Home heating fuel

Utility gas	27%
Fuel oil, kerosene	—
Electricity	49%
Bottled/tank/LP	12%
Other/none	12%

Mobile, Ala.

Housing units	161,248
Central cooling	50%
Room units	29%

Home heating system

Warm air furnace	54%
Hydronic	1%
Heat pump	4%
Built-in electric	4%
Floor, wall furnace	8%
Room heaters	16%
Other/none	13%

Home heating fuel

Utility gas	63%
Fuel oil, kerosene	—
Electricity	24%
Bottled/tank/LP	9%
Other/none	4%

Montgomery, Ala.

Housing units	100,626
Central cooling	49%
Room units	28%

Home heating system

Warm air furnace	55%
Hydronic	1%
Heat pump	4%
Built-in electric	3%
Floor, wall furnace	5%
Room heaters	21%
Other/none	11%

Home heating fuel

Utility gas	66%
Fuel oil, kerosene	—
Electricity	18%
Bottled/tank/LP	11%
Other/none	5%

Yuma, Ariz.

Housing units	21,050
Central cooling	71%
Room units	14%

Home heating system

Warm air furnace	57%
Hydronic	2%
Heat pump	10%
Built-in electric	10%
Floor, wall furnace	4%
Room heaters	10%
Other/none	9%

Home heating fuel

Utility gas	50%
Fuel oil, kerosene	—
Electricity	49%
Bottled/tank/LP	1%
Other/none	—

Chico, Calif.

Housing units	60,760
Central cooling	43%
Room units	32%

Home heating system

Warm air furnace	42%
Hydronic	—
Heat pump	5%
Built-in electric	5%
Floor, wall furnace	18%
Room heaters	13%
Other/none	17%

Home heating fuel

Utility gas	64%
Fuel oil, kerosene	—
Electricity	18%
Bottled/tank/LP	7%
Other/none	11%

Riverside, Calif.

Housing units	658,172
Central cooling	48%
Room units	24%

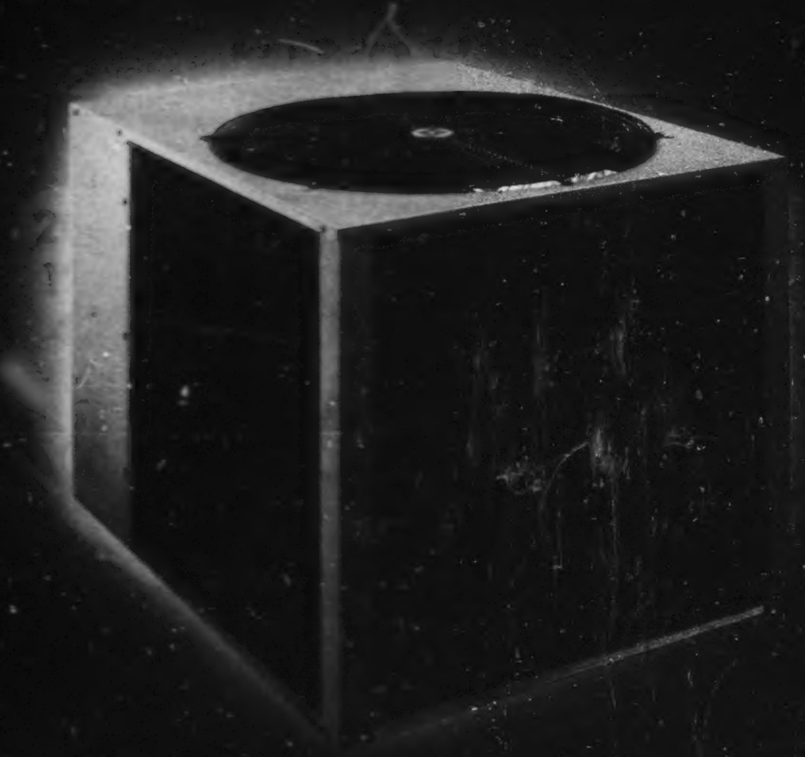
Home heating system

Warm air furnace	56%
Hydronic	—
Heat pump	2%
Built-in electric	5%
Floor, wall furnace	21%
Room heaters	12%
Other/none	4%

Home heating fuel

Utility gas	83%
Fuel oil, kerosene	—
Electricity	11%
Bottled/tank/LP	—
Other/none	6%

Square D residential condensing units now have a 9-plus SEER.



Sun Dial split system condensing units from Square D have long proven themselves with dependable operation.

Now, the nine-plus Seasonal Energy Efficiency Rating of our 1½ to 4 ton units meets any state's current minimum energy efficiency standards. This also qualifies them for most local utilities' rebate programs for big savings with the installation of our split systems.

Consider, too, our other energy efficient Sun Dial products like gas or electric furnaces, heat pumps and packaged rooftop units.

For complete information and the name and phone number of the nearest Sun Dial Distributor, contact Square D Company, Dept. SA, P.O. Box 766, Mesquite, Texas 75149-0160. (214)288-7431.

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HEATING AND AIR CONDITIONING
SQUARE D COMPANY

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But to understand how well our educational programs and service resources help both patients and their families, simply talk to one out of every 100 Americans who are part of our volunteer program. Or talk to one of the 3 million who've survived cancer.

The battle isn't over but we are winning.

Please support the American Cancer Society.

AMERICAN
CANCER
SOCIETY®

Santa Cruz, Calif.

Housing units	79,512
Central cooling	3%
Room units	3%

Home heating system

Warm air furnace	42%
Hydronic	2%
Heat pump	2%
Built-in electric	11%
Floor, wall furnace	19%
Room heaters	14%
Other/none	12%

Home heating fuel

Utility gas	69%
Fuel oil, kerosene	—
Electricity	17%
Bottled/tank/LP	6%
Other/none	8%

Ft. Collins, Colo.

Housing units	58,366
Central cooling	10%
Room units	12%

Home heating system

Warm air furnace	62%
Hydronic	16%
Heat pump	3%
Built-in electric	8%
Floor, wall furnace	3%
Room heaters	3%
Other/none	5%

Home heating fuel

Utility gas	80%
Fuel oil, kerosene	—
Electricity	12%
Bottled/tank/LP	4%
Other/none	4%

Greeley, Colo.

Housing units	46,049
Central cooling	12%
Room units	12%

Home heating system

Warm air furnace	67%
Hydronic	14%
Heat pump	1%
Built-in electric	3%
Floor, wall furnace	3%
Room heaters	9%
Other/none	3%

Home heating fuel

Utility gas	79%
Fuel oil, kerosene	—
Electricity	5%
Bottled/tank/LP	12%
Other/none	4%

Pueblo, Colo.

Housing units	48,647
Central cooling	25%
Room units	33%

Home heating system

Warm air furnace	69%
Hydronic	10%
Heat pump	1%
Built-in electric	2%
Floor, wall furnace	6%
Room heaters	8%
Other/none	4%

Home heating fuel

Utility gas	89%
Fuel oil, kerosene	—
Electricity	6%
Bottled/tank/LP	4%
Other/none	1%

Danbury, Conn.

Housing units	51,695
Central cooling	4%
Room units	37%

Home heating system

Warm air furnace	25%
Hydronic	49%
Heat pump	2%
Built-in electric	16%
Floor, wall furnace	1%
Room heaters	2%
Other/none	5%

Home heating fuel

Utility gas	12%
Fuel oil, kerosene	67%
Electricity	19%
Bottled/tank/LP	1%
Other/none	1%

Norwalk, Conn.

Housing units	46,327
Central cooling	9%
Room units	46%

Home heating system

Warm air furnace	28%
Hydronic	59%
Heat pump	1%
Built-in electric	5%
Floor, wall furnace	1%
Room heaters	2%
Other/none	7%

Home heating fuel

Utility gas	11%
Fuel oil, kerosene	80%
Electricity	8%
Bottled/tank/LP	1%
Other/none	—

Florida

Bradenton, Fla.

Housing units	82,798
Central cooling	59%
Room units	26%

Home heating system

Warm air furnace	41%
Hydronic	1%
Heat pump	20%
Built-in electric	17%
Floor, wall furnace	4%
Room heaters	12%
Other/none	5%

Home heating fuel

Utility gas	5%
Fuel oil, kerosene	10%
Electricity	69%
Bottled/tank/LP	13%
Other/none	3%

Daytona Beach, Fla.

Housing units	121,523
Central cooling	59%
Room units	21%

Home heating system

Warm air furnace	51%
Hydronic	1%
Heat pump	12%
Built-in electric	9%
Floor, wall furnace	6%
Room heaters	15%
Other/none	6%

Home heating fuel

Utility gas	13%
Fuel oil, kerosene	26%
Electricity	49%
Bottled/tank/LP	12%
Other/none	—

Ft. Meyers, Fla.

Housing units	108,663
Central cooling	70%
Room units	19%

Home heating system

Warm air furnace	44%
Hydronic	1%
Heat pump	21%
Built-in electric	18%
Floor, wall furnace	1%
Room heaters	7%
Other/none	8%

Home heating fuel

Utility gas	2%
Fuel oil, kerosene	2%
Electricity	82%
Bottled/tank/LP	10%
Other/none	4%

Lakeland, Fla.

Housing units	126,742
Central cooling	45%
Room units	28%

Home heating system

Warm air furnace	36%
Hydronic	—
Heat pump	13%
Built-in electric	12%
Floor, wall furnace	6%
Room heaters	16%
Other/none	17%

Home heating fuel

Utility gas	8%
Fuel oil, kerosene	14%
Electricity	53%
Bottled/tank/LP	22%
Other/none	3%

Melbourne, Fla.

Housing units	113,077
Central cooling	66%
Room units	19%

Home heating system

Warm air furnace	50%
Hydronic	—
Heat pump	19%
Built-in electric	9%
Floor, wall furnace	2%
Room heaters	11%
Other/none	9%

Home heating fuel

Utility gas	17%
Fuel oil, kerosene	14%
Electricity	57%
Bottled/tank/LP	9%
Other/none	3%

Ocala, Fla.

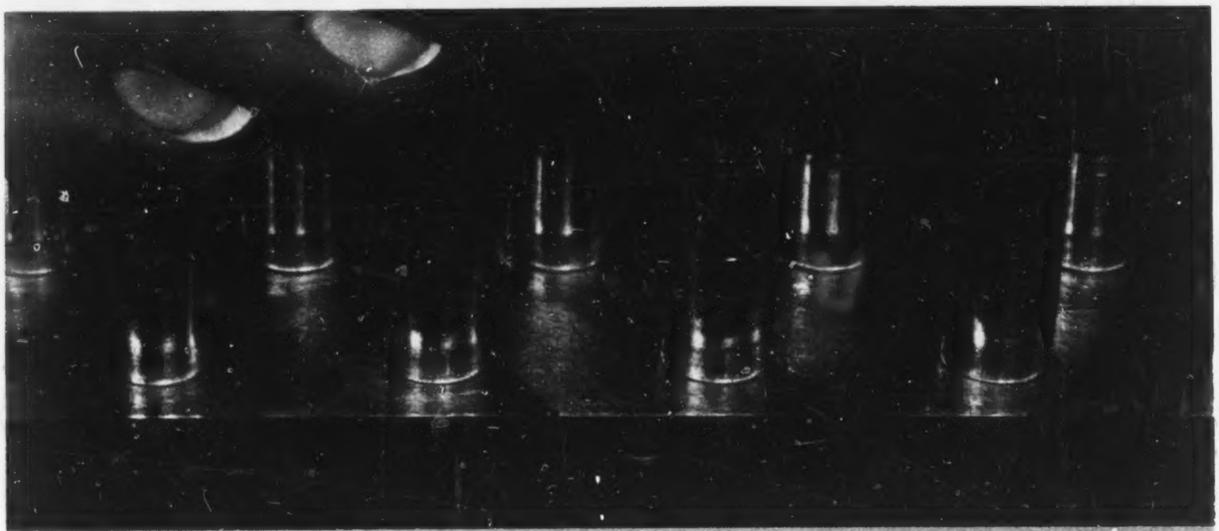
Housing units	51,691
Central cooling	51%
Room units	20%

Home heating system

Warm air furnace	55%
Hydronic	—
Heat pump	8%
Built-in electric	7%
Floor, wall furnace	2%
Room heaters	18%
Other/none	10%

Home heating fuel

Utility gas	13%
Fuel oil, kerosene	16%
Electricity	36%
Bottled/tank/LP	27%
Other/none	8%

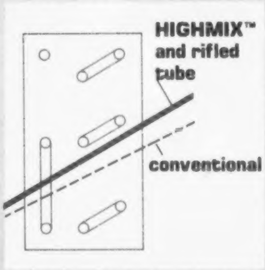


Increased Performance.

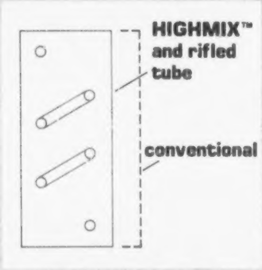
A key reason for combining Sundstrand's HIGHMIX™ fin and rifled tubing in evaporator and condenser units.

Rifled interior walls create better flow mix, enabling the liquid to absorb and transfer heat more efficiently. The HIGHMIX fin breaks up the air path, reducing the boundary layer and promoting increased mixing. The result: increased coil performance over conventional designs - up to 12% in evaporators and up to 10% in condensers.

Your system requires top performance. Through these enhancements, Sundstrand can meet your design parameters at a reduced cost. To learn how you can increase unit capacity by up to 10% or reduce the envelope size by up to 15%, contact either your Sundstrand Heat Transfer regional sales manager or our application engineering department. 616/782-2141



INCREASED CAPACITY



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Do you have an application which requires a correctly sized, multi-section, specially equipped -

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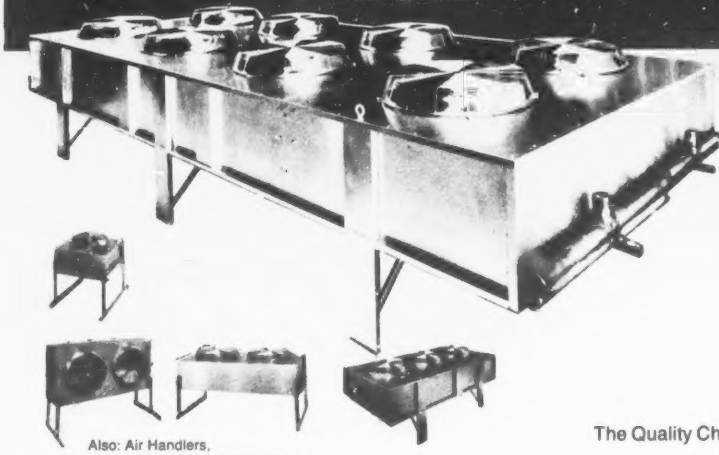
Witt is your answer with 22 different models from one through 100 nominal tons that are designed to deliver the highest performance and efficiency possible.



Also: Air Handlers,
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You'll find the answers to questions concerning Remote Air Cooled Condensers when you send for WITT'S 20 page catalog #105.

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Telephone (901) 853-2770

WITT

Circle 72 on Reader Action Card

Sarasota, Fla.

Housing units	112,196
Central cooling	71%
Room units	20%

Home heating system

Warm air furnace	44%
Hydronic	1%
Heat pump	27%
Built-in electric	13%
Floor, wall furnace	2%
Room heaters	7%
Other/none	6%

Home heating fuel

Utility gas	3%
Fuel oil, kerosene	14%
Electricity	73%
Bottled/tank/LP	7%
Other/none	3%

West Palm Beach, Fla.

Housing units	286,784
Central cooling	65%
Room units	24%

Home heating system

Warm air furnace	34%
Hydronic	1%
Heat pump	20%
Built-in electric	25%
Floor, wall furnace	1%
Room heaters	8%
Other/none	11%

Home heating fuel

Utility gas	8%
Fuel oil, kerosene	2%
Electricity	78%
Bottled/tank/LP	7%
Other/none	5%

Bloomington, Ill.

Housing units	45,276
Central cooling	42%
Room units	31%

Home heating system

Warm air furnace	80%
Hydronic	9%
Heat pump	1%
Built-in electric	2%
Floor, wall furnace	1%
Room heaters	1%
Other/none	6%

Home heating fuel

Utility gas	78%
Fuel oil, kerosene	6%
Electricity	5%
Bottled/tank/LP	5%
Other/none	6%

Decatur, Ill.

Housing units	51,560
Central cooling	37%
Room units	36%

Home heating system

Warm air furnace	80%
Hydronic	8%
Heat pump	2%
Built-in electric	3%
Floor, wall furnace	4%
Room heaters	3%
Other/none	—

Home heating fuel

Utility gas	90%
Fuel oil, kerosene	1%
Electricity	8%
Bottled/tank/LP	—
Other/none	1%

Elkhart, Ind.

Housing units	51,794
Central cooling	24%
Room units	22%

Home heating system

Warm air furnace	75%
Hydronic	10%
Heat pump	1%
Built-in electric	4%
Floor, wall furnace	1%
Room heaters	2%
Other/none	7%

Home heating fuel

Utility gas	73%
Fuel oil, kerosene	12%
Electricity	8%
Bottled/tank/LP	2%
Other/none	5%

Muncie, Ind.

Housing units	47,524
Central cooling	21%
Room units	27%

Home heating system

Warm air furnace	57%
Hydronic	4%
Heat pump	4%
Built-in electric	2%
Floor, wall furnace	14%
Room heaters	8%
Other/none	11%

Home heating fuel

Utility gas	64%
Fuel oil, kerosene	7%
Electricity	23%
Bottled/tank/LP	3%
Other/none	3%

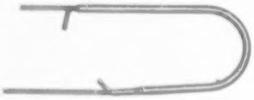
THE INDUSTRY'S ORIGINAL HIGH-EFFICIENCY TUBE-IN-TUBE COAXIAL HEAT EXCHANGERS

- **Now available in titanium as well as stainless steel, copper and cupro-nickel**
- **Single-wall or vented double-wall construction**
- **Unique applied fin construction**

Trombone

Spiral

Helix



J-Shape

Check the following and see why Edwards, the originator, is the industry's recognized leader.

Unique Design — Edwards unique applied fin construction eliminates work stress and thinning of heat exchange tube walls. In both single-wall and vented double-wall construction, this design offers the highest heat transfer efficiency and the most reliable construction for coaxial coil applications. U.L. and C.S.A. approved.

Size and Selection — Edwards has a wide range of sizes and configurations available in the greatest selection of materials ... titanium, stainless steel, copper, cupro-nickel and others ... from ¼ to 100-tons and larger ... in helix, spiral, trombone, U- and J-shapes ... plus custom-designs for your needs, including multiple manifolded designs.

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The Originator — Edwards was the originator of the standard applied finned tube coaxial heat exchanger design ... 37 years later, we're still the nation's prime manufacturer of this design.

Manufacturers of air conditioners, heat pumps and chillers, throughout the industry use Edwards' coaxial heat exchangers as desuperheaters, condensers, evaporators. Contact us today about your application.

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Manufacturers of Packaged Heating and Cooling Equipment

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Circle 21 on Reader Action Card

Dubuque, Iowa

Housing units	31,426
Central cooling	26%
Room units	32%

Home heating system

Warm air furnace	71%
Hydronic	13%
Heat pump	2%
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	4%
Other/none	6%

Home heating fuel

Utility gas	60%
Fuel oil, kerosene	20%
Electricity	7%
Bottled/tank/LP	7%
Other/none	6%

Iowa City, Iowa

Housing units	31,472
Central cooling	39%
Room units	33%

Home heating system

Warm air furnace	71%
Hydronic	15%
Heat pump	1%
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	3%
Other/none	6%

Home heating fuel

Utility gas	86%
Fuel oil, kerosene	7%
Electricity	3%
Bottled/tank/LP	2%
Other/none	2%

Sioux City, Iowa

Housing units	45,111
Central cooling	38%
Room units	37%

Home heating system

Warm air furnace	76%
Hydronic	7%
Heat pump	2%
Built-in electric	2%
Floor, wall furnace	4%
Room heaters	2%
Other/none	7%

Home heating fuel

Utility gas	89%
Fuel oil, kerosene	1%
Electricity	5%
Bottled/tank/LP	3%
Other/none	2%

Waterloo, Iowa

Housing units	44,354
Central cooling	43%
Room units	29%

Home heating system

Warm air furnace	82%
Hydronic	5%
Heat pump	2%
Built-in electric	1%
Floor, wall furnace	1%
Room heaters	3%
Other/none	6%

Home heating fuel

Utility gas	76%
Fuel oil, kerosene	7%
Electricity	10%
Bottled/tank/LP	2%
Other/none	5%

Lawrence, Kan.

Housing units	25,491
Central cooling	52%
Room units	24%

Home heating system

Warm air furnace	80%
Hydronic	4%
Heat pump	1%
Built-in electric	2%
Floor, wall furnace	4%
Room heaters	5%
Other/none	4%

Home heating fuel

Utility gas	83%
Fuel oil, kerosene	—
Electricity	9%
Bottled/tank/LP	6%
Other/none	2%

Owensboro, Ky.

Housing units	31,653
Central cooling	45%
Room units	29%

Home heating system

Warm air furnace	65%
Hydronic	2%
Heat pump	4%
Built-in electric	5%
Floor, wall furnace	9%
Room heaters	4%
Other/none	11%

Home heating fuel

Utility gas	73%
Fuel oil, kerosene	1%
Electricity	13%
Bottled/tank/LP	3%
Other/none	10%

AIR BALANCE METER

FLOWHOOD

Air conditioning system efficiency depends on properly balanced air distribution. The FlowHood measures air flow at supply and return outlets with ease and accuracy. This precision instrument features light weight, durability and direct readout from 30 to 2000 CFM. Model CFM-83 includes five top sizes and a sturdy carrying case.

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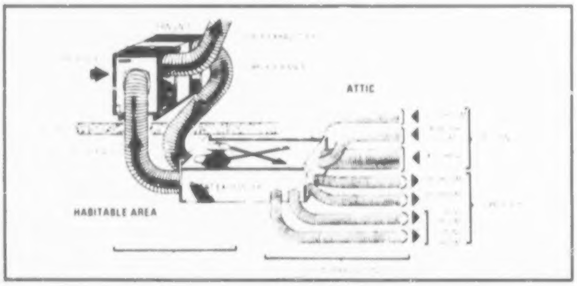
RESIDENTIAL HEAT RECOVERY VENTILATION SYSTEM

☆ ALDES ☆



- SAVES ENERGY
- AVOID INDOOR CONDENSATION
- SUPPLIES FRESH AIR
- REMOVES STALE AIR AND POLLUTANTS
- HEALTHFUL AND COMFORTABLE INDOOR ENVIRONMENT

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More people have survived cancer than now live in the City of Los Angeles.

We are winning.

Please support the AMERICAN CANCER SOCIETY®

Alexandria, La.

Housing units	54,523
Central cooling	39%
Room units	39%

Home heating system

Warm air furnace	46%
Hydronic	1%
Heat pump	2%
Built-in electric	3%
Floor, wall furnace	6%
Room heaters	36%
Other/none	6%

Home heating fuel

Utility gas	66%
Fuel oil, kerosene	—
Electricity	20%
Bottled/tank/LP	8%
Other/none	6%

Lafayette, La.

Housing units	53,083
Central cooling	64%
Room units	25%

Home heating system

Warm air furnace	62%
Hydronic	1%
Heat pump	4%
Built-in electric	5%
Floor, wall furnace	5%
Room heaters	11%
Other/none	12%

Home heating fuel

Utility gas	60%
Fuel oil, kerosene	—
Electricity	34%
Bottled/tank/LP	3%
Other/none	3%

Monroe, La.

Housing units	51,410
Central cooling	49%
Room units	32%

Home heating system

Warm air furnace	61%
Hydronic	1%
Heat pump	4%
Built-in electric	4%
Floor, wall furnace	7%
Room heaters	12%
Other/none	11%

Home heating fuel

Utility gas	68%
Fuel oil, kerosene	—
Electricity	27%
Bottled/tank/LP	3%
Other/none	2%

Bangor, Maine

Housing units	30,388
Central cooling	1%
Room units	7%

Home heating system

Warm air furnace	37%
Hydronic	43%
Heat pump	1%
Built-in electric	7%
Floor, wall furnace	—
Room heaters	2%
Other/none	10%

Home heating fuel

Utility gas	—
Fuel oil, kerosene	82%
Electricity	7%
Bottled/tank/LP	1%
Other/none	10%

Lewiston, Maine

Housing units	27,836
Central cooling	1%
Room units	15%

Home heating system

Warm air furnace	22%
Hydronic	59%
Heat pump	—
Built-in electric	7%
Floor, wall furnace	1%
Room heaters	4%
Other/none	7%

Home heating fuel

Utility gas	8%
Fuel oil, kerosene	77%
Electricity	8%
Bottled/tank/LP	—
Other/none	7%

Hagerstown, Md.

Housing units	42,009
Central cooling	17%
Room units	33%

Home heating system

Warm air furnace	40%
Hydronic	24%
Heat pump	2%
Built-in electric	14%
Floor, wall furnace	2%
Room heaters	6%
Other/none	12%

Home heating fuel

Utility gas	13%
Fuel oil, kerosene	59%
Electricity	18%
Bottled/tank/LP	2%
Other/none	8%

Massachusetts - Minnesota

Fitchburg, Mass.

Housing units	37,276
Central cooling	2%
Room units	27%

Home heating system

Warm air furnace	22%
Hydronic	49%
Heat pump	1%
Built-in electric	8%
Floor, wall furnace	—
Room heaters	11%
Other/none	9%

Home heating fuel

Utility gas	34%
Fuel oil, kerosene	51%
Electricity	9%
Bottled/tank/LP	2%
Other/none	4%

Pittsfield, Mass.

Housing units	34,776
Central cooling	2%
Room units	10%

Home heating system

Warm air furnace	15%
Hydronic	65%
Heat pump	—
Built-in electric	8%
Floor, wall furnace	—
Room heaters	8%
Other/none	4%

Home heating fuel

Utility gas	27%
Fuel oil, kerosene	58%
Electricity	6%
Bottled/tank/LP	3%
Other/none	6%

Battle Creek, Mich.

Housing units	71,710
Central cooling	8%
Room units	18%

Home heating system

Warm air furnace	75%
Hydronic	8%
Heat pump	—
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	7%
Other/none	6%

Home heating fuel

Utility gas	62%
Fuel oil, kerosene	24%
Electricity	5%
Bottled/tank/LP	3%
Other/none	6%

Bay City, Mich.

Housing units	43,116
Central cooling	7%
Room units	19%

Home heating system

Warm air furnace	70%
Hydronic	14%
Heat pump	1%
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	7%
Other/none	4%

Home heating fuel

Utility gas	78%
Fuel oil, kerosene	12%
Electricity	2%
Bottled/tank/LP	2%
Other/none	6%

Benton Harbor, Mich.

Housing units	65,635
Central cooling	15%
Room units	26%

Home heating system

Warm air furnace	63%
Hydronic	8%
Heat pump	2%
Built-in electric	12%
Floor, wall furnace	2%
Room heaters	8%
Other/none	5%

Home heating fuel

Utility gas	58%
Fuel oil, kerosene	18%
Electricity	17%
Bottled/tank/LP	2%
Other/none	5%

Rochester, Minn.

Housing units	34,278
Central cooling	29%
Room units	27%

Home heating system

Warm air furnace	71%
Hydronic	18%
Heat pump	2%
Built-in electric	2%
Floor, wall furnace	—
Room heaters	3%
Other/none	4%

Home heating fuel

Utility gas	75%
Fuel oil, kerosene	9%
Electricity	6%
Bottled/tank/LP	6%
Other/none	4%

DOES YOUR HOME HEATING SYSTEM OFFER... 91-95% A.F.U.E.

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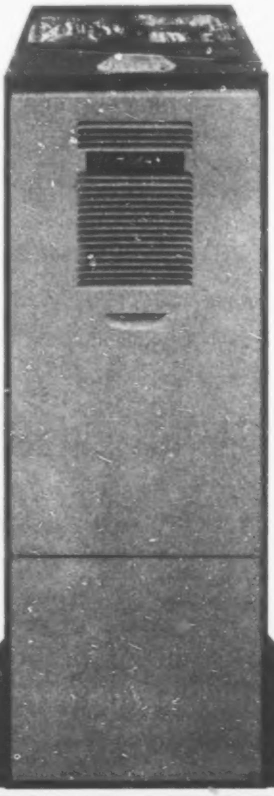

YOUR BOTTOM LINE ENERGY DEFENSE!

RECLAIMER II

HEAT CONTROLLER, INC. Jackson, Michigan 49203
THE QUALITY LEADER IN CONDITIONING AIR

Circle 31 on Reader Action Card

Minnesota - Montana

St. Cloud, Minn.

Housing units	52,009
Central cooling	10%
Room units	25%

Home heating system

Warm air furnace	54%
Hydronic	17%
Heat pump	2%
Built-in electric	10%
Floor, wall furnace	1%
Room heaters	7%
Other/none	9%

Home heating fuel

Utility gas	33%
Fuel oil, kerosene	35%
Electricity	12%
Bottled/tank/LP	10%
Other/none	10%

Pascagoula, Miss.

Housing units	41,966
Central cooling	61%
Room units	24%

Home heating system

Warm air furnace	63%
Hydronic	1%
Heat pump	4%
Built-in electric	4%
Floor, wall furnace	4%
Room heaters	20%
Other/none	4%

Home heating fuel

Utility gas	46%
Fuel oil, kerosene	—
Electricity	38%
Bottled/tank/LP	11%
Other/none	5%

Columbia, Mo.

Housing units	37,386
Central cooling	49%
Room units	27%

Home heating system

Warm air furnace	68%
Hydronic	5%
Heat pump	5%
Built-in electric	4%
Floor, wall furnace	2%
Room heaters	8%
Other/none	8%

Home heating fuel

Utility gas	63%
Fuel oil, kerosene	1%
Electricity	22%
Bottled/tank/LP	6%
Other/none	8%

Joplin, Mo.

Housing units	52,169
Central cooling	25%
Room units	35%

Home heating system

Warm air furnace	44%
Hydronic	2%
Heat pump	2%
Built-in electric	4%
Floor, wall furnace	19%
Room heaters	19%
Other/none	12%

Home heating fuel

Utility gas	69%
Fuel oil, kerosene	1%
Electricity	8%
Bottled/tank/LP	15%
Other/none	7%

St. Joseph, Mo.

Housing units	41,502
Central cooling	29%
Room units	34%

Home heating system

Warm air furnace	73%
Hydronic	7%
Heat pump	2%
Built-in electric	4%
Floor, wall furnace	6%
Room heaters	3%
Other/none	5%

Home heating fuel

Utility gas	78%
Fuel oil, kerosene	3%
Electricity	8%
Bottled/tank/LP	8%
Other/none	3%

Great Falls, Mont.

Housing units	31,875
Central cooling	10%
Room units	13%

Home heating system

Warm air furnace	71%
Hydronic	13%
Heat pump	1%
Built-in electric	5%
Floor, wall furnace	4%
Room heaters	3%
Other/none	3%

Home heating fuel

Utility gas	77%
Fuel oil, kerosene	3%
Electricity	8%
Bottled/tank/LP	3%
Other/none	9%

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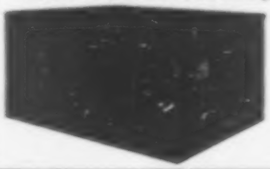

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Estate planning:
Prus and cons of joint tenancy
see page 5
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'90% rule' OK
Supreme Court upholds changes in construction wage formula
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BNP

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Missoula, Mont.

Housing units	23,542
Central cooling	6%
Room units	8%

Home heating system

Warm air furnace	52%
Hydronic	13%
Heat pump	—
Built-in electric	13%
Floor, wall furnace	4%
Room heaters	9%
Other/none	9%

Home heating fuel

Utility gas	77%
Fuel oil, kerosene	1%
Electricity	14%
Bottled/tank/LP	—
Other/none	8%

Nashua, N. H.

Housing units	40,068
Central cooling	8%
Room units	35%

Home heating system

Warm air furnace	30%
Hydronic	40%
Heat pump	2%
Built-in electric	14%
Floor, wall furnace	—
Room heaters	5%
Other/none	9%

Home heating fuel

Utility gas	39%
Fuel oil, kerosene	39%
Electricity	18%
Bottled/tank/LP	1%
Other/none	3%

Long Branch, N. J.

Housing units	180,885
Central cooling	24%
Room units	42%

Home heating system

Warm air furnace	44%
Hydronic	38%
Heat pump	2%
Built-in electric	9%
Floor, wall furnace	2%
Room heaters	4%
Other/none	1%

Home heating fuel

Utility gas	45%
Fuel oil, kerosene	41%
Electricity	12%
Bottled/tank/LP	1%
Other/none	1%

New Brunswick, N. J.

Housing units	203,395
Central cooling	25%
Room units	51%

Home heating system

Warm air furnace	42%
Hydronic	48%
Heat pump	1%
Built-in electric	4%
Floor, wall furnace	1%
Room heaters	3%
Other/none	1%

Home heating fuel

Utility gas	52%
Fuel oil, kerosene	40%
Electricity	6%
Bottled/tank/LP	—
Other/none	4%

Vineland, N. J.

Housing units	46,679
Central cooling	17%
Room units	41%

Home heating system

Warm air furnace	52%
Hydronic	28%
Heat pump	1%
Built-in electric	5%
Floor, wall furnace	2%
Room heaters	7%
Other/none	5%

Home heating fuel

Utility gas	25%
Fuel oil, kerosene	66%
Electricity	7%
Bottled/tank/LP	1%
Other/none	1%

Las Cruces, N. M.

Housing units	33,519
Central cooling	64%
Room units	21%

Home heating system

Warm air furnace	58%
Hydronic	1%
Heat pump	3%
Built-in electric	3%
Floor, wall furnace	9%
Room heaters	18%
Other/none	6%

Home heating fuel

Utility gas	70%
Fuel oil, kerosene	—
Electricity	13%
Bottled/tank/LP	13%
Other/none	4%

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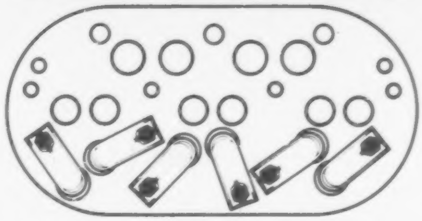

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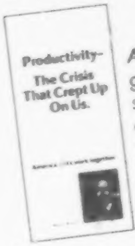
Circle 9 on Reader Action Card

IGNORANCE IS NO EXCUSE.

America's declining productivity is serious business.

It's about time we all got serious about it.



America's productivity growth rate has been slipping badly for several years now, compared to that of other nations. And it's adversely affecting each and every one of us.

We've all seen plants and businesses close down. Tens of thousands of jobs lost. Prices rising, quality deteriorating. A flood of foreign-made products invading our shores. It's all part of our declining productivity rate.

We've simply got to work it out—and we've got to work together to do it. But first, we need to know more about the problem and the possible solutions so we can act intelligently and effectively.

That's why you should send for this informative new booklet. It hasn't got all the answers—there are no quick and easy ways out—but it's a very good place to start the productivity education of yourself, your associates and your workers. It's free for the asking—and in quantity. Mail the coupon right away. Ignorance is no excuse.

Ad Council
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America.
Let's work together.

National Productivity Awareness Campaign A
P.O. Box 480, Lorton, VA 22079

Yes, I would like to improve my company's productivity. Please send me a free copy of "Productivity: the crisis that crept up on us." (Quantities available at cost from above address.)

Name ______________________

Title ______________________

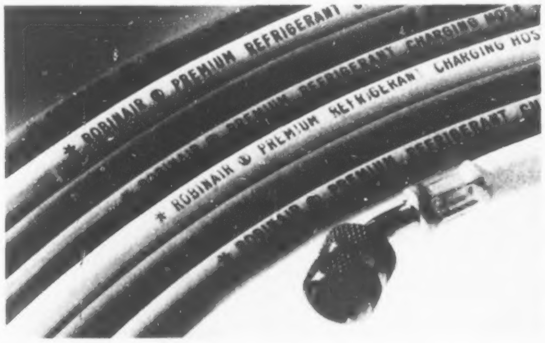
Company ______________________

City __________ State ______ Zip ______

Please allow 4-6 weeks for delivery.

	Santa Fe, N. M.	Elmira, N. Y.	Glen Falls, N. Y.
Housing units	20,106	36,513	41,126
Central cooling	15%	3%	2%
Room units	4%	17%	17%
Home heating system			
Warm air furnace	50%	61%	44%
Hydronic	9%	22%	24%
Heat pump	1%	—	1%
Built-in electric	4%	6%	7%
Floor, wall furnace	10%	1%	7%
Room heaters	20%	3%	5%
Other/none	6%	7%	12%
Home heating fuel			
Utility gas	78%	79%	25%
Fuel oil, kerosene	—	9%	51%
Electricity	17%	6%	11%
Bottled/tank/LP	3%	1%	2%
Other/none	2%	5%	11%

SMART CHOICE!



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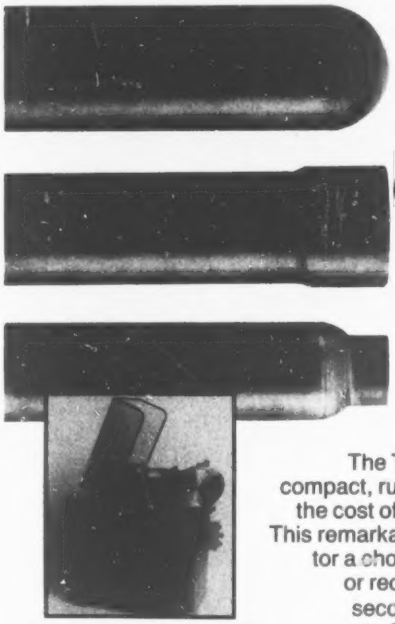

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A Public Service of This Publication Ad Council

Nassau-Suffolk, N. Y.

Housing units	837,616
Central cooling	11%
Room units	50%

Home heating system

Warm air furnace	17%
Hydronic	74%
Heat pump	—
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	3%
Other/none	2%

Home heating fuel

Utility gas	20%
Fuel oil, kerosene	74%
Electricity	4%
Bottled/tank/LP	1%
Other/none	1%

Newburgh, N. Y.

Housing units	90,437
Central cooling	4%
Room units	33%

Home heating system

Warm air furnace	29%
Hydronic	56%
Heat pump	—
Built-in electric	4%
Floor, wall furnace	1%
Room heaters	4%
Other/none	6%

Home heating fuel

Utility gas	38%
Fuel oil, kerosene	50%
Electricity	6%
Bottled/tank/LP	1%
Other/none	5%

Poughkeepsie, N. Y.

Housing units	85,445
Central cooling	5%
Room units	37%

Home heating system

Warm air furnace	28%
Hydronic	54%
Heat pump	1%
Built-in electric	7%
Floor, wall furnace	—
Room heaters	5%
Other/none	5%

Home heating fuel

Utility gas	15%
Fuel oil, kerosene	71%
Electricity	9%
Bottled/tank/LP	2%
Other/none	3%

Burlington, N. C.

Housing units	38,161
Central cooling	32%
Room units	34%

Home heating system

Warm air furnace	42%
Hydronic	3%
Heat pump	7%
Built-in electric	11%
Floor, wall furnace	8%
Room heaters	18%
Other/none	11%

Home heating fuel

Utility gas	23%
Fuel oil, kerosene	24%
Electricity	40%
Bottled/tank/LP	6%
Other/none	7%

Hickory, N. C.

Housing units	48,423
Central cooling	44%
Room units	29%

Home heating system

Warm air furnace	40%
Hydronic	4%
Heat pump	8%
Built-in electric	17%
Floor, wall furnace	4%
Room heaters	13%
Other/none	14%

Home heating fuel

Utility gas	11%
Fuel oil, kerosene	33%
Electricity	44%
Bottled/tank/LP	1%
Other/none	11%

Jacksonville, N. C.

Housing units	34,239
Central cooling	47%
Room units	29%

Home heating system

Warm air furnace	44%
Hydronic	1%
Heat pump	15%
Built-in electric	17%
Floor, wall furnace	9%
Room heaters	8%
Other/none	6%

Home heating fuel

Utility gas	3%
Fuel oil, kerosene	40%
Electricity	40%
Bottled/tank/LP	12%
Other/none	5%

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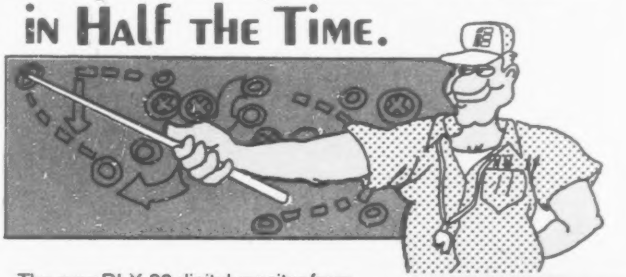

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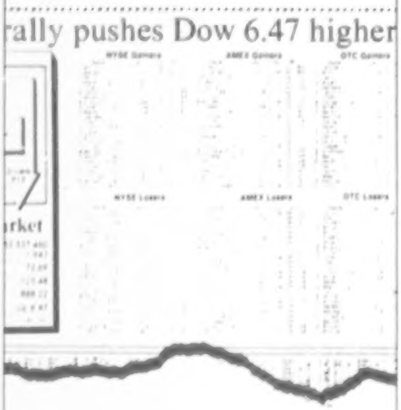
Avoid capital gains tax. Support the American Heart Association.



rally pushes Dow 6.47 higher

By supporting the American Heart Association you may:

- avoid capital gains tax on appreciated securities or other property
- reduce current and future income taxes
- provide a lifetime income for yourself or beneficiaries
- avoid probate and publicity
- maximize new estate tax savings

It may pay you to inquire about the American Heart Association's Planned Giving Program by contacting your local American Heart Association.

Sometimes, it can be better to give than to receive.

American Heart Association

WE'RE FIGHTING FOR YOUR LIFE

Salisbury, N. C.

Housing units	71,258
Central cooling	27%
Room units	35%

Home heating system

Warm air furnace	42%
Hydronic	4%
Heat pump	8%
Built-in electric	11%
Floor, wall furnace	6%
Room heaters	20%
Other/none	9%

Home heating fuel

Utility gas	18%
Fuel oil, kerosene	48%
Electricity	26%
Bottled/tank/LP	2%
Other/none	6%

Bismarck, N. D.

Housing units	30,046
Central cooling	20%
Room units	32%

Home heating system

Warm air furnace	63%
Hydronic	23%
Heat pump	2%
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	3%
Other/none	5%

Home heating fuel

Utility gas	85%
Fuel oil, kerosene	—
Electricity	7%
Bottled/tank/LP	7%
Other/none	1%

Fargo, N. D.

Housing units	52,715
Central cooling	19%
Room units	38%

Home heating system

Warm air furnace	52%
Hydronic	23%
Heat pump	4%
Built-in electric	15%
Floor, wall furnace	1%
Room heaters	4%
Other/none	1%

Home heating fuel

Utility gas	35%
Fuel oil, kerosene	35%
Electricity	25%
Bottled/tank/LP	3%
Other/none	2%

Grand Forks, N. D.

Housing units	38,104
Central cooling	13%
Room units	26%

Home heating system

Warm air furnace	53%
Hydronic	16%
Heat pump	3%
Built-in electric	16%
Floor, wall furnace	1%
Room heaters	8%
Other/none	3%

Home heating fuel

Utility gas	26%
Fuel oil, kerosene	44%
Electricity	22%
Bottled/tank/LP	3%
Other/none	5%

Mansfield, Ohio

Housing units	49,120
Central cooling	8%
Room units	17%

Home heating system

Warm air furnace	67%
Hydronic	8%
Heat pump	2%
Built-in electric	8%
Floor, wall furnace	3%
Room heaters	7%
Other/none	5%

Home heating fuel

Utility gas	67%
Fuel oil, kerosene	15%
Electricity	11%
Bottled/tank/LP	2%
Other/none	5%

Newark, Ohio

Housing units	44,576
Central cooling	23%
Room units	21%

Home heating system

Warm air furnace	70%
Hydronic	2%
Heat pump	5%
Built-in electric	7%
Floor, wall furnace	5%
Room heaters	4%
Other/none	7%

Home heating fuel

Utility gas	62%
Fuel oil, kerosene	12%
Electricity	17%
Bottled/tank/LP	4%
Other/none	5%

LEADERSHIP
Through Quality

FASCO, a quality leader for over 50 years, provides the customer with the most reliable and efficient source of power for his needs. The high quality built into all FASCO motors assures long trouble-free operation.

FASCO motors are designed for easy selection and installation by the contractor. The line includes exact OEM replacement motors, as well as versatile standard models for most HVAC applications and truck inventory.

FASCO Quality Replacement Motors are available in a broad range of sizes, types and configurations. Next-day shipment from stock assures high turnover of distributor inventory. Every motor is "run-in" at the factory to reduce the possibility of motor burn "opens", or overload protector cycling ... eliminating costly callbacks.

For complete information on FASCO Replacement Motors write, or call: FASCO DISTRIBUTING COMPANY 1415 ELBRIDGE PAYNE ROAD, CHESTERFIELD, MO 63017 PHONE: 800-325-8313.

QUALITY FROM THE LEADER IN AIR CONDITIONING REPLACEMENT MOTORS

FASCO®
INDUSTRIES, INC.

A HAWKER SIDDELEY COMPANY

FASCO RUNS 'EM ALL FIRST!

Circle 24 on Reader Action Card

Enid, Okla.

Housing units	25,523
Central cooling	48%
Room units	36%

Home heating system

Warm air furnace	56%
Hydronic	—
Heat pump	1%
Built-in electric	3%
Floor, wall furnace	24%
Room heaters	12%
Other/none	4%

Home heating fuel

Utility gas	83%
Fuel oil, kerosene	—
Electricity	13%
Bottled/tank/LP	2%
Other/none	2%

Lawton, Okla.

Housing units	39,943
Central cooling	46%
Room units	38%

Home heating system

Warm air furnace	54%
Hydronic	2%
Heat pump	2%
Built-in electric	6%
Floor, wall furnace	18%
Room heaters	15%
Other/none	2%

Home heating fuel

Utility gas	74%
Fuel oil, kerosene	—
Electricity	20%
Bottled/tank/LP	5%
Other/none	1%

Medford, Ore.

Housing units	52,024
Central cooling	23%
Room units	27%

Home heating system

Warm air furnace	27%
Hydronic	1%
Heat pump	9%
Built-in electric	23%
Floor, wall furnace	4%
Room heaters	10%
Other/none	26%

Home heating fuel

Utility gas	20%
Fuel oil, kerosene	8%
Electricity	43%
Bottled/tank/LP	4%
Other/none	25%

Altoona, Pa.

Housing units	51,849
Central cooling	4%
Room units	16%

Home heating system

Warm air furnace	57%
Hydronic	29%
Heat pump	—
Built-in electric	6%
Floor, wall furnace	—
Room heaters	4%
Other/none	4%

Home heating fuel

Utility gas	61%
Fuel oil, kerosene	24%
Electricity	8%
Bottled/tank/LP	1%
Other/none	6%

Sharon, Pa.

Housing units	47,295
Central cooling	6%
Room units	15%

Home heating system

Warm air furnace	79%
Hydronic	11%
Heat pump	—
Built-in electric	—
Floor, wall furnace	1%
Room heaters	6%
Other/none	3%

Home heating fuel

Utility gas	73%
Fuel oil, kerosene	20%
Electricity	3%
Bottled/tank/LP	1%
Other/none	3%

State College, Pa.

Housing units	38,242
Central cooling	11%
Room units	18%

Home heating system

Warm air furnace	31%
Hydronic	32%
Heat pump	3%
Built-in electric	18%
Floor, wall furnace	2%
Room heaters	4%
Other/none	10%

Home heating fuel

Utility gas	10%
Fuel oil, kerosene	53%
Electricity	25%
Bottled/tank/LP	1%
Other/none	11%

Pennsylvania - Texas

Williamsport, Pa.

Housing units	45,216
Central cooling	4%
Room units	22%

Home heating system

Warm air furnace	42%
Hydronic	36%
Heat pump	1%
Built-in electric	11%
Floor, wall furnace	1%
Room heaters	4%
Other/none	15%

Home heating fuel

Utility gas	18%
Fuel oil, kerosene	56%
Electricity	12%
Bottled/tank/LP	2%
Other/none	12%

Florence, S. C.

Housing units	39,115
Central cooling	37%
Room units	38%

Home heating system

Warm air furnace	24%
Hydronic	—
Heat pump	21%
Built-in electric	15%
Floor, wall furnace	5%
Room heaters	15%
Other/none	20%

Home heating fuel

Utility gas	7%
Fuel oil, kerosene	34%
Electricity	46%
Bottled/tank/LP	10%
Other/none	3%

Rock Hill, S. C.

Housing units	36,881
Central cooling	33%
Room units	32%

Home heating system

Warm air furnace	42%
Hydronic	2%
Heat pump	13%
Built-in electric	11%
Floor, wall furnace	6%
Room heaters	12%
Other/none	14%

Home heating fuel

Utility gas	15%
Fuel oil, kerosene	41%
Electricity	32%
Bottled/tank/LP	4%
Other/none	8%

Rapid City, S. D.

Housing units	20,162
Central cooling	15%
Room units	33%

Home heating system

Warm air furnace	69%
Hydronic	12%
Heat pump	4%
Built-in electric	5%
Floor, wall furnace	5%
Room heaters	5%
Other/none	—

Home heating fuel

Utility gas	88%
Fuel oil, kerosene	—
Electricity	10%
Bottled/tank/LP	—
Other/none	2%

Johnson City, Tenn.

Housing units	165,757
Central cooling	15%
Room units	29%

Home heating system

Warm air furnace	18%
Hydronic	2%
Heat pump	9%
Built-in electric	35%
Floor, wall furnace	2%
Room heaters	8%
Other/none	26%

Home heating fuel

Utility gas	6%
Fuel oil, kerosene	15%
Electricity	57%
Bottled/tank/LP	2%
Other/none	20%

Abilene, Tex.

Housing units	53,587
Central cooling	43%
Room units	41%

Home heating system

Warm air furnace	51%
Hydronic	—
Heat pump	2%
Built-in electric	3%
Floor, wall furnace	11%
Room heaters	25%
Other/none	8%

Home heating fuel

Utility gas	73%
Fuel oil, kerosene	—
Electricity	15%
Bottled/tank/LP	8%
Other/none	4%

We're giving Heil a good plug...

...with a great premium promotion on network TV

This multi-talented Magnavox Home Communications Center features a telephone, speaker phone, digital clock, AM/FM radio, cassette player/recorder and answering machine.

Dubb enjoys the fine comforts of a Heil furnace that keeps him warm and saves him money.

Dubb confesses that with cool Heil central air conditioning, he'd rather do his fishing at home.

Dubb tries to demonstrate how an energy efficient Heil heat pump works to save you money.

Heil is back on network TV promoting the dependable line of quality Heil heating and cooling products. And, giving consumers the opportunity to get a tremendous deal on a Magnavox telephone/radio answering machine when they purchase a selected cooling system during the pre-season. These commercials will be appearing on the biggest selection of top TV shows in our history. We'll be on the *TODAY SHOW, GOOD MORNING AMERICA, TODAY AT SUNRISE, ABC NEWS THIS MORNING, NBC EVENING NEWS, WIDE WORLD OF SPORTS*, and *THE TONIGHT SHOW WITH JOHNNY CARSON*.

The commercials star Dubb Taylor, making a return engagement from last year's Energy Marshal II commercial. Dubb is America's premier character actor. He has appeared in more movies than any actor alive. In addition to the national commercial, we've also developed a series of commercials starring Dubb for local use. These spots promote furnaces, air conditioners and heat pumps.

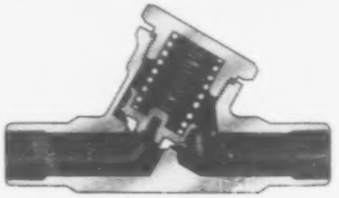
If you're a Heil dealer, get your commercials and start running them. If you're not a Heil dealer but you would like more information about becoming one, call your local Heil distributor.

HEIL

HEATING & COOLING PRODUCTS

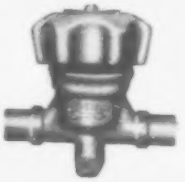
Circle 33 on Reader Action Card

Superior designs with the Serviceman in mind



Type 802-B Check Valves

Compact, forged brass bodies. Teflon seats and copper gaskets for use in service temperatures as high as 400°F.

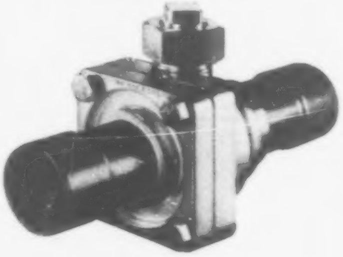


"Tuffy" Forged Brass Shut-off Valves

Compact...packless construction permits maintenance-free service.

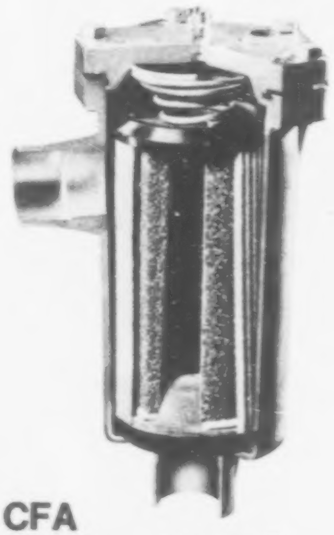
Super-pleated Suction Line Filters

Protects compressors from contaminants . . . one of the major causes of compressor burnouts.



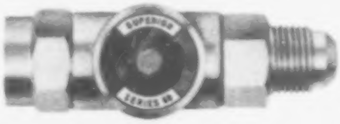
Full-port Ball Valves

All forged-brass construction. Full-flow ports in every size from ⅜" thru 2⅛" ODS. Dual-seal Teflon ball seals assure positive leak-proof operation. Lowest possible pressure-drop provided. Non-directional flow, can be installed in any position. Easy to solder into line without disassembly.



CFA Uni-form Shells®

All brass, of course. Make it easy to install a variety of cartridges for clean-up or permanent use. The best protection for the heart of any system—the compressor.



Series 60 Moisture-Liquid Indicators

True hermetic seal. Compact, forged brass bodies with large viewing area.

See your wholesaler for Superior's complete line of air conditioning and refrigeration components or write for Catalog R-16.

Superior
Valve Company
2200 N. Main Street
Washington, Pa. 15301

See your Superior Wholesaler for Quick Delivery.

Circle 63 on Reader Action Card

Bryan, Tex.

Housing units	35,575
Central cooling	66%
Room units	23%

Home heating system

Warm air furnace	66%
Hydronic	—
Heat pump	5%
Built-in electric	4%
Floor, wall furnace	2%
Room heaters	20%
Other/none	3%

Home heating fuel

Utility gas	59%
Fuel oil, kerosene	—
Electricity	34%
Bottled/tank/LP	6%
Other/none	1%

Killeen, Tex.

Housing units	75,439
Central cooling	59%
Room units	25%

Home heating system

Warm air furnace	61%
Hydronic	—
Heat pump	3%
Built-in electric	5%
Floor, wall furnace	6%
Room heaters	20%
Other/none	5%

Home heating fuel

Utility gas	53%
Fuel oil, kerosene	—
Electricity	35%
Bottled/tank/LP	9%
Other/none	3%

Laredo, Tex.

Housing units	27,599
Central cooling	30%
Room units	32%

Home heating system

Warm air furnace	27%
Hydronic	4%
Heat pump	3%
Built-in electric	4%
Floor, wall furnace	4%
Room heaters	36%
Other/none	18%

Home heating fuel

Utility gas	75%
Fuel oil, kerosene	—
Electricity	24%
Bottled/tank/LP	1%
Other/none	—

Longview, Tex.

Housing units	59,511
Central cooling	53%
Room units	31%

Home heating system

Warm air furnace	54%
Hydronic	—
Heat pump	3%
Built-in electric	3%
Floor, wall furnace	5%
Room heaters	29%
Other/none	6%

Home heating fuel

Utility gas	69%
Fuel oil, kerosene	—
Electricity	20%
Bottled/tank/LP	7%
Other/none	4%

Midland, Tex.

Housing units	31,360
Central cooling	65%
Room units	26%

Home heating system

Warm air furnace	68%
Hydronic	—
Heat pump	2%
Built-in electric	4%
Floor, wall furnace	13%
Room heaters	12%
Other/none	—

Home heating fuel

Utility gas	76%
Fuel oil, kerosene	—
Electricity	22%
Bottled/tank/LP	2%
Other/none	—

Odessa, Tex.

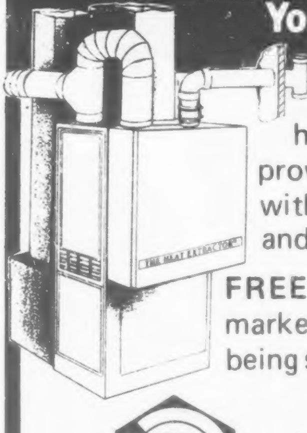
Housing units	42,610
Central cooling	60%
Room units	33%

Home heating system

Warm air furnace	57%
Hydronic	—
Heat pump	2%
Built-in electric	3%
Floor, wall furnace	14%
Room heaters	17%
Other/none	7%

Home heating fuel

Utility gas	73%
Fuel oil, kerosene	—
Electricity	20%
Bottled/tank/LP	3%
Other/none	4%



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A Unique Opportunity To
EXPAND
Your Business

Sell and install a highly profitable, proven heating product with an immense market and little competition.

FREE technical, sales and marketing seminars are being scheduled locally.

Call
800-633-3324

HEAT EXTRACTOR
2 MAIN STREET, MELROSE, MA 02176

Circle 32 on Reader Action Card

“When you need humidity”

Condair Electrode Steam Humidifiers defeat dry air and static electricity, and improve comfort. Self-contained, minimal maintenance, controlled clean humidification. Capacities 5 to 180 pounds per hour.

Nortec

Nortec Industries Inc
P.O. Box 698, Bridge Plaza, Ogdensburg, NY 13669, (315) 425-1255 Telex: 90-2250
Nortec Air Conditioning Industries Ltd.
2760 Fenton Road, Ottawa, Ontario, K1G 3N3, (613) 822-0335 Telex: 053-3552

Circle 43 on Reader Action Card

OVER THE YEARS YOU'VE CALLED SMOKING SUAVE, CHIC, SMART, COOL, HOT, HIP, HEP, SWANK, NATTY, SHARP, BOSS, KEEN, IN, FAR-OUT, NEAT, GROOVY, SWELL, & ULTRA.

NOW CALL IT QUITS.

Once and for all. Because, the fact is, smoking's not stylish. It's foolish. And a major risk factor leading to cardiovascular disease as well as other serious health problems.

For information and ideas to help you — or those you love — stop smoking, contact the American Heart Association. Today.

WE'RE FIGHTING FOR YOUR LIFE

American Heart Association

San Angelo, Tex.

Housing units	32,585
Central cooling	47%
Room units	41%

Home heating system

Warm air furnace	50%
Hydronic	1%
Heat pump	2%
Built-in electric	6%
Floor, wall furnace	13%
Room heaters	22%
Other/none	6%

Home heating fuel

Utility gas	63%
Fuel oil, kerosene	—
Electricity	27%
Bottled/tank/LP	8%
Other/none	2%

Sherman, Tex.

Housing units	37,384
Central cooling	43%
Room units	38%

Home heating system

Warm air furnace	46%
Hydronic	—
Heat pump	3%
Built-in electric	1%
Floor, wall furnace	9%
Room heaters	30%
Other/none	11%

Home heating fuel

Utility gas	67%
Fuel oil, kerosene	—
Electricity	12%
Bottled/tank/LP	18%
Other/none	3%

Tyler, Tex.

Housing units	50,848
Central cooling	56%
Room units	26%

Home heating system

Warm air furnace	56%
Hydronic	—
Heat pump	3%
Built-in electric	3%
Floor, wall furnace	5%
Room heaters	24%
Other/none	9%

Home heating fuel

Utility gas	61%
Fuel oil, kerosene	—
Electricity	24%
Bottled/tank/LP	12%
Other/none	3%

Victoria, Tex.

Housing units	24,584
Central cooling	50%
Room units	29%

Home heating system

Warm air furnace	50%
Hydronic	—
Heat pump	4%
Built-in electric	4%
Floor, wall furnace	4%
Room heaters	29%
Other/none	9%

Home heating fuel

Utility gas	52%
Fuel oil, kerosene	—
Electricity	35%
Bottled/tank/LP	11%
Other/none	2%

Wichita Falls, Tex.

Housing units	52,413
Central cooling	50%
Room units	41%

Home heating system

Warm air furnace	54%
Hydronic	—
Heat pump	4%
Built-in electric	3%
Floor, wall furnace	12%
Room heaters	24%
Other/none	3%

Home heating fuel

Utility gas	76%
Fuel oil, kerosene	—
Electricity	20%
Bottled/tank/LP	2%
Other/none	2%

Charlottesville, Va.

Housing units	42,897
Central cooling	29%
Room units	29%

Home heating system

Warm air furnace	35%
Hydronic	14%
Heat pump	7%
Built-in electric	14%
Floor, wall furnace	2%
Room heaters	12%
Other/none	16%

Home heating fuel

Utility gas	30%
Fuel oil, kerosene	28%
Electricity	28%
Bottled/tank/LP	2%
Other/none	12%

Virginia - Washington

Petersburg, Va.

Housing units	45,203
Central cooling	33%
Room units	38%

Home heating system

Warm air furnace	40%
Hydronic	9%
Heat pump	7%
Built-in electric	13%
Floor, wall furnace	7%
Room heaters	7%
Other/none	17%

Home heating fuel

Utility gas	29%
Fuel oil, kerosene	36%
Electricity	29%
Bottled/tank/LP	2%
Other/none	4%

Bellingham, Wash.

Housing units	43,674
Central cooling	2%
Room units	1%

Home heating system

Warm air furnace	33%
Hydronic	7%
Heat pump	4%
Built-in electric	35%
Floor, wall furnace	1%
Room heaters	10%
Other/none	10%

Home heating fuel

Utility gas	26%
Fuel oil, kerosene	15%
Electricity	46%
Bottled/tank/LP	3%
Other/none	10%

Bremerton, Wash.

Housing units	56,699
Central cooling	2%
Room units	1%

Home heating system

Warm air furnace	43%
Hydronic	3%
Heat pump	3%
Built-in electric	32%
Floor, wall furnace	2%
Room heaters	9%
Other/none	8%

Home heating fuel

Utility gas	13%
Fuel oil, kerosene	27%
Electricity	52%
Bottled/tank/LP	2%
Other/none	6%

Olympia, Wash.

Housing units	49,672
Central cooling	3%
Room units	1%

Home heating system

Warm air furnace	36%
Hydronic	4%
Heat pump	4%
Built-in electric	36%
Floor, wall furnace	3%
Room heaters	6%
Other/none	11%

Home heating fuel

Utility gas	19%
Fuel oil, kerosene	14%
Electricity	57%
Bottled/tank/LP	2%
Other/none	8%

Richland, Wash.

Housing units	55,683
Central cooling	47%
Room units	38%

Home heating system

Warm air furnace	49%
Hydronic	1%
Heat pump	8%
Built-in electric	35%
Floor, wall furnace	1%
Room heaters	4%
Other/none	2%

Home heating fuel

Utility gas	7%
Fuel oil, kerosene	8%
Electricity	84%
Bottled/tank/LP	—
Other/none	1%

Yakima, Wash.

Housing units	65,330
Central cooling	20%
Room units	31%

Home heating system

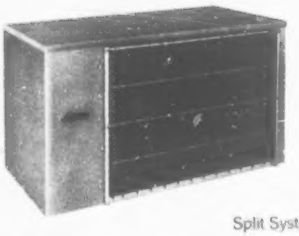
Warm air furnace	38%
Hydronic	2%
Heat pump	5%
Built-in electric	28%
Floor, wall furnace	3%
Room heaters	12%
Other/none	12%

Home heating fuel

Utility gas	20%
Fuel oil, kerosene	21%
Electricity	49%
Bottled/tank/LP	2%
Other/none	8%

Built into every Bard heat pump is something unusual. 23 years experience.

Talk to the Bard brothers.

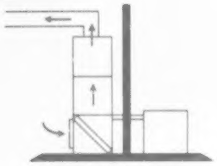


Split System

Not many manufacturers can make a claim like that. Since 1962, Bard has been a pioneer in the development of heat pumps. And we're proud to say that through the years, we've continued to develop and improve our line of quality, efficient, trouble-free "air-to-air" heat pumps.

Indoor Blower Coil Unit

Bard offers a complete line of heat pumps for homes, apartments, commercial and small industrial facilities, mobile homes and modular structures. In fact, our product line is one of the largest in the industry, with capacities from 1½ to 5 tons.

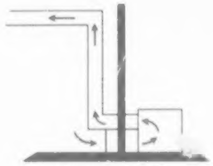


Split System
Typical Installation

Ask for Rich or Jim.

And the applications are virtually unlimited. Choose packaged and hi-boy units for through-the-wall applications. Split systems for add-on applications or separate duct systems. Special packaged units for high-static applications (mobile homes and modular structures). Or down discharge roof-top units that use one roof curb for 2½ through 5 ton sizes.

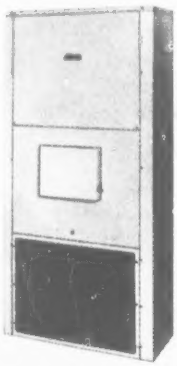
Packaged Unit



Packaged Unit
Typical Installation

No matter what your need, Bard has the versatility to handle it. And the experience to back it up.

For superior quality, high efficiency and trouble-free operation, count on a leader in heat pump technology. Call a Bard today. With a 23-year head start, it's easy to see why we're leading the pack.



Hi-Boy Unit

Roof-Top Unit

Bard Manufacturing Company
Bryan, Ohio 43506

(419) 636-7400

Since 1914 . . . Moving ahead, just as planned. Bard

Circle 7 on Reader Action Card

Wisconsin

Eau Claire, Wisc.

Housing units	46,681
Central cooling	13%
Room units	21%

Home heating system

Warm air furnace	61%
Hydronic	10%
Heat pump	3%
Built-in electric	9%
Floor, wall furnace	1%
Room heaters	10%
Other/none	6%

Home heating fuel

Utility gas	25%
Fuel oil, kerosene	48%
Electricity	14%
Bottled/tank/LP	9%
Other/none	4%

Janesville, Wisc.

Housing units	51,373
Central cooling	16%
Room units	32%

Home heating system

Warm air furnace	78%
Hydronic	13%
Heat pump	—
Built-in electric	2%
Floor, wall furnace	2%
Room heaters	4%
Other/none	1%

Home heating fuel

Utility gas	70%
Fuel oil, kerosene	17%
Electricity	4%
Bottled/tank/LP	6%
Other/none	3%

La Crosse, Wisc.

Housing units	33,062
Central cooling	24%
Room units	30%

Home heating system

Warm air furnace	64%
Hydronic	12%
Heat pump	2%
Built-in electric	6%
Floor, wall furnace	1%
Room heaters	4%
Other/none	11%

Home heating fuel

Utility gas	38%
Fuel oil, kerosene	44%
Electricity	13%
Bottled/tank/LP	4%
Other/none	1%

Racine, Wisc.

Housing units	61,626
Central cooling	15%
Room units	30%

Home heating system

Warm air furnace	74%
Hydronic	15%
Heat pump	1%
Built-in electric	3%
Floor, wall furnace	2%
Room heaters	5%
Other/none	—

Home heating fuel

Utility gas	71%
Fuel oil, kerosene	20%
Electricity	5%
Bottled/tank/LP	2%
Other/none	2%

Sheboygan, Wisc.

Housing units	36,711
Central cooling	6%
Room units	19%

Home heating system

Warm air furnace	67%
Hydronic	17%
Heat pump	—
Built-in electric	4%
Floor, wall furnace	1%
Room heaters	8%
Other/none	3%

Home heating fuel

Utility gas	69%
Fuel oil, kerosene	20%
Electricity	3%
Bottled/tank/LP	3%
Other/none	5%

Wausau, Wisc.

Housing units	39,220
Central cooling	4%
Room units	13%

Home heating system

Warm air furnace	72%
Hydronic	13%
Heat pump	1%
Built-in electric	3%
Floor, wall furnace	1%
Room heaters	4%
Other/none	6%

Home heating fuel

Utility gas	54%
Fuel oil, kerosene	32%
Electricity	5%
Bottled/tank/LP	8%
Other/none	1%

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Plant Size
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William Stamm
Resident Plant Manager
Milledgeville, Georgia
Plant Size
540,000 Sq. Ft.

Lawrence F. Ichniowski
Resident Plant Manager
Fort Smith, Arkansas
Plant Size
872,000 Sq. Ft.

Joe Pehr
Vice President of Operations
Fort Smith, Arkansas

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214,799 units were shipped in 1983, the latest year for which figures are available. This represents a 3.7% increase over the 207,232 fancoil units shipped in 1982. Of those shipped in 1983, 61% were vertical units and 39% were horizontal units.

Cooling towers

The only figures available for cooling towers are those collected by the Bureau of the Census. In 1983, the latest year for which figures are available, the bureau reported a total of 11,304 cooling towers were shipped. This total was relatively unchanged from the 11,222 cooling towers reported shipped in 1982.

Refrigeration

Unit shipments of commercial refrigeration equipment increased by 3.8% in 1984 when compared with performance during the previous year, according to the Commercial Refrigerator Manufacturers Association (CRMA).

The trade association does not report numerical totals for either total shipments or the various equipment categories. Based on the percentages supplied by CRMA, plus prior-year data published by the Air-Conditioning and Refrigeration Institute (ARI) and the Bureau of the Census, The News estimates that commercial refrigeration shipments in 1983 totaled 90,000 units. The increase in 1984 would bring the new total to 93,400 units.

CRMA reported that shipments of standard-temperature cases in 1984 increased by 5.2% over similar shipments in 1983. Shipments of reach-in cases increased by 5.7% last year over the 1983 total, and shipments of "other" units were up 2.4%.

Shipments of standard-temperature island units, a new category, increased by 9.9% in 1984. CRMA no longer provides figures on walk-in coolers.

Shipments of low-temperature cases increased by 6.5% in 1984 over the previous-year totals. For the same period, shipments on low-temperature single-decks declined by 24.9%, multidecks were up 1.6%, and enclosed low-temperature cases were up 5%. Shipments of island low-temperature display cases, another new category, were up 18.6%.

Every five years, the Bureau of the Census publishes figures on commercial refrigeration equipment that includes much more than the equipment normally used in supermarkets. The latest report, issued in 1984, covers shipments in 1982 and compares them with shipments for 1977. Dollars are current for the year reported.

According to this report, the manufacture of commercial refrigeration equipment in 1982 totaled $1.064 billion, an increase of 40% from the $759.4 million reported for 1977.

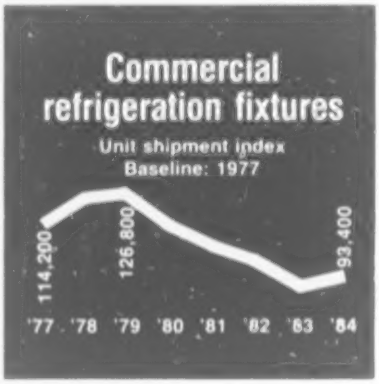
The Census Bureau reported that 68,800 sectional coolers, prefabricated walk-in and roll-in coolers, and combination cooler-display units were shipped in 1982. There was not comparable shipment total for 1977 but the dollar value total increased by 39% from $158.6 million in 1977 to $220.5 million in 1982.

Normal-temperature reach-ins shipped in 1982 totaled 121,500 units, up 64.2% from the 74,000 units reported for 1977. The dollar value, however, increased by 97.4% from $68.2 million in 1977 to $134.6 million five years later.

The bureau reported normal-temperature closed case shipments totaled 16,000 units in 1982, up 42.9% from the 11,200 total for 1977. Open single-level cases were down 5% from 26,000 in 1977 to 24,700 in 1982. And open multilevels were almost even with a total of 31,700 units in 1977 and 31,300 units in 1982.

Low-temperature reach-ins shipped in 1982 totaled 43,500 units, according to the bureau, up 45.5% from the 29,900-unit total in 1977. Ice cream dispensing-hardening cabinet shipments totaled 13,700 units in 1982, up 11.4% from the 12,300-unit total in 1977.

Closed frozen food single-level cabinet shipments in 1982 totaled 13,200 units, down 59% from the 32,200-unit total five years earlier. On the other hand, closed frozen food multilevel cabinet shipments increased by 7.3% from 11,000 units in 1977 to 11,800 units in 1982. Shipments of frozen food cabinets other than reach-ins totaled 14,800 units in 1982, up 131% from the 6,400-unit total in 1977.



The value of other commercial refrigeration equipment, including dough retarders, egg refrigerators, environmental control equipment, laboratory, industrial, and unclassified products increased by 35.5% from $87 million in 1977 to $117.7 million in 1982.

Again we must emphasize that these Bureau of the Census figures include equipment that finds its way into convenience stores, restaurants, and industrial applications as well as supermarkets. Too, the bureau reported that some of the quantities represent estimates with an error factor as high as 29%.

According to C-Store Business, there were 29,550 supermarkets in the U.S. in 1983. And although the magazine estimated there were 40,400 convenience stores, it added that these stores accounted for only 6.3% of the nation's grocery sales.

The Food Marketing Institute (FMI) defines supermarkets as retail food stores with at least $2 million in annual sales. FMI reported that 3.7% of the nation's supermarkets in 1983 were new that year, 6.3% were remodels, and another 4.3% were closed. All three categories were down from the year-previous experience: 4.5% new, 7.7% remodels, and 5.8% closed.

Of the supermarket population, FMI reported that in 1983 conventional supermarkets (less than 30,000 sq ft) accounted for 55.4%; super stores (more than 30,000 sq ft) accounted for 29.2%; combination stores (more than 30,000 sq ft, of which at least 25% is devoted to general merchandise) accounted for 11.3%; warehouse stores accounted for 3.1%; and limited assortment stores for 0.9%.

But of those stores added to the inventory in 1983, super stores accounted for 41.2%, combination stores for 31.4%, conventional stores 16.4%, warehouse stores 8.4%, and limited assortment stores 2.6%. The median size for all stores in 1983 was 38,000 sq ft, up substantially from the 28,000 sq ft average for the late 1970's.

The median size of new stores added to the inventory in 1983 was: Conventional stores 22,000 sq ft; super stores 38,000 sq ft; combination stores 49,450 sq ft; and warehouse stores 23,500 sq ft. Of the total inventory, 67.2% of the nation's supermarkets are leased from another company, 23.9% are owned, and 8.9% are leased from a subsidiary.

According to FMI, the median capital investment per remodeling is $400,000. The median age of a store from first opening to remodeling is 10 years and the median time span between remodels is seven years.

In the case of convenience stores, C-Store Business reported that the typical cost of a new store in 1983 was $369,900, including $76,300 for gasoline-related costs, $112,800 for the building, $93,500 for the land, $36,900 for in-store inventory — and $50,400 for equipment and fixtures.

Similarly, the publication reported that more than 20% of independent convenience stores were opting to remodel at an average cost of $30,000. Of these remodels, an estimated 47% involved additional refrigerated equip-

TURN TO NEXT PAGE

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FROM PRECEDING PAGE

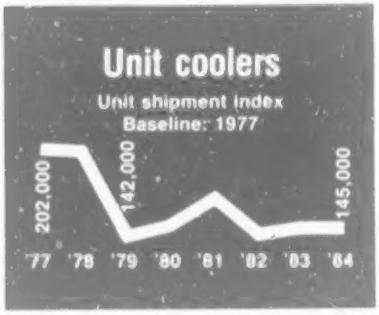
ment, 28% involved insulation, and 61% involved in-store cooking equipment.

Refrigerators

Domestic refrigerator shipments totaled 5,994,100 last year, up 9.5% from the 5,476,500 units shipped in 1983, according to the Association of Home Appliance Manufacturers (AHAM).

Continuing consumer confidence and a comparatively strong housing market should keep the refrigerator market about even in 1985.

Shipments of home freezers in 1984 totaled 1,280,700 units, down 4.5% from the 1,341,300-unit total in the previous year. The 1984 breakdown shows that 631,100 units, or 47%, were upright freezers and 649,600 units, or 53%, were chest-type freezers — an identical ratio with 1983.



Unit coolers

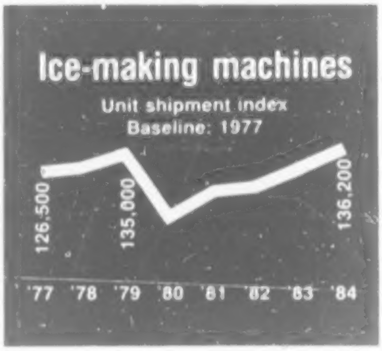
Shipments of unit coolers, at 145,200 in 1984, were almost dead even with the revised total of 144,700 unit coolers shipped in 1983.

It might be noted that the Bureau of the Census reported that 187,762 unit coolers were shipped in 1983, the latest year for which figures are available, up 14.7% from the 163,697 unit coolers reported shipped in 1982.

In the case, the industry figures do not include either exports or the production of some significant manufacturers.

Ice-makers

Shipments of ice-making equipment increased by 6% in 1984 to a total of 136,200 units. The total for 1983 was 128,400 units. The News believes that 74% were cubers, 15% were flakers, and the remaining 11% were miscellaneous and combination units.



The Bureau of the Census reported that 165,766 ice makers were shipped in 1983, the latest year for which figures are available, up 10.2% from the 150,475 ice makers shipped in the previous year.

Although there is an obvious disparity between these two sets of figures, they are much closer than they have been in the past. Most of the difference now is believed to be in the fact that industry figures include only U.S. shipments and the bureau's figures include exports.

Refrigerated warehouses

Refrigerated storage capacity in the U.S. in 1984 totaled 2.07 billion gross cu ft, an increase of 7% over the year-previous total, according to the Department of Agriculture.

Gross freezer space represented 58% of that capacity. The remaining 42% was gross cooler space.

Usable refrigerated space amounted to 75.9% of the gross space in 1983. Total usable cooler space was 77.1% of the gross and total usable freezer space was 75% of the gross.

The five states with the largest gross warehouse capacity are: Washington (353 million cu ft); California (242 million cu ft); Florida (161 million cu ft); Oregon (115 million cu ft); and New York (96 million cu ft).

The International Association of Refrigerated Warehouses (IARW) reported that the trend toward fewer but larger warehouses is continuing. Rising energy costs also have influenced many owners to take many older warehouses out of service.

Heating.

Residential boilers

Gas-, oil-, and solid fuel-fired boiler unit shipments all showed healthy increases in 1984, a fact that spoke well of their strength in the replacement markets. Total shipments last year amounted to 277,216 units, a 20.4% increase over the 230,165-unit total in 1983, according to The Hydronics Institute (HI).

Shipments of **cast-iron boilers**, at 237,860 units in 1984, were up 19% from the 199,953 units shipped in the previous year. Shipments of **steel boilers** increased by 30.3% from a total of 30,212 units in 1983 to 39,356 units last year.

To add a bit of context, the surge of gas-fired boiler shipments of five years ago is over. It was brought on by high oil prices and the availability of natural gas, which had been curtailed for nearly a decade in many parts of the country. Since then, oil prices have peaked and softened while gas prices have continued to escalate, although at a slower rate in the last 18 months.

The gas share of the cast-iron boiler market, which had soared to 85% in 1980, settled back to a more normal 71% in 1981 and 66.9% last year. It had dropped to 50% in 1977, the last year of widespread gas curtailments. It might also be noted that only 2.4% of steel boilers shipped last year were fired by natural gas. Of the remainder, 88.8% were oil-fired and 8.8% were shipped bare (without burners).

Oil's share of the cast-iron boiler market in 1984 was 33.1%, down slightly from the 35.9% share it held

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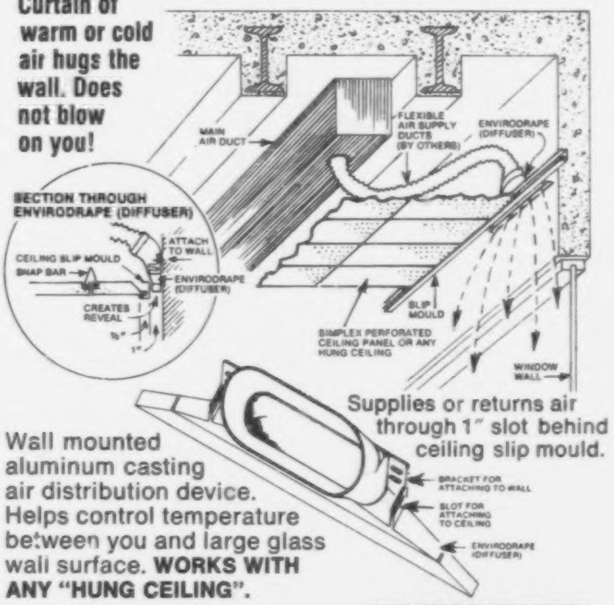
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in the previous year but still more than double the 15% share oil held in 1980. The oil share in 1977 was 49.5%.

Cast-iron boilers fired by solid fuels (coal, wood, waste) amounted to 0.04% of the total in 1984, the same percentage as in the previous year but down sharply from the 0.3% share in 1981.

The share of cast iron hot water boilers, at 77.8%, continued to hold relatively constant, as did cast-iron steam boilers at 22.2%. The shares in 1982 were 75.1% hot water and 24.9% steam.

Radiation shipments in 1984, according to HI, were: convectors 2,598,330 sq ft EDR (equivalent direct radiation), up 32.4% from the 1983 figure of 1,962,318 sq ft EDR; baseboard 12,000,375 lineal ft, up 18.5% from the 1983 total of 10,123,364 lineal ft; and commercial finned tube 8,000,795 sq ft EDR, up 22.5% from the 1983 total of 6,533,158 sq ft EDR.

Even with these increases, however, shipments of radiation products are far below those of only a few years ago. Total shipments in 1979, for example, amounted to 57.8 million sq ft EDR. Although the number of conversions from electric resistance baseboard has fallen off sharply, the prime reason for the drop is the strong boiler replacement market — about 85% of the total — where radiation already is in place.

The recovery of the new home market has not helped hydronics greatly, primarily because this home heating method has captured only 4% of the new single-family home market in recent years.

This independence from the often-volatile new-home market is not all bad. The steady replacement market, together with the now well-documented trend among homeowners to replace working equipment because of efficiency, makes for dependability if not meteoric growth. Look for a steady year in 1985 with totals in line with last year's performance.

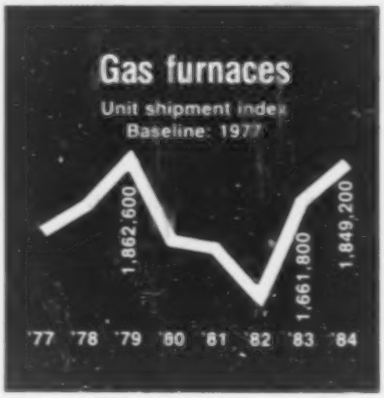
Residential furnaces

An increase in replacement sales, together with a continuing recovery in the new home market in the Northeast and in the Midwest, has helped **oil furnace** shipments to continue to bounce back from the fuel oil price-induced slide of 1979 and 1980.

Oil furnace shipments in 1984 totaled 148,025 units, an increase of 16.3% over the year-previous total of

Estimated 1984 cast iron boiler shipments by thermal capacity

Gross output, Btu/h	Steam	Water	Total
Less than 50,000	1,237	9,966	11,203
50,000 to 74,999	968	20,774	21,742
75,000 to 99,999	7,816	38,794	46,610
100,000 to 124,999	13,788	46,591	60,379
125,000 to 149,999	7,125	30,083	37,208
150,000 to 199,999	8,462	20,139	28,601
200,000 to 249,999	4,383	9,078	13,461
250,000 to 449,999	4,156	6,149	10,305
450,000 to 949,999	2,229	1,747	3,976
950,000 to 1,549,999	1,211	818	2,029
1,550,000 and over	1,437	909	2,346
Total	**52,812**	**185,048**	**237,860**



Estimated 1984 cast iron boiler shipments by fuel

Gross output, Btu/h	Solid fuel	Gas-fired	Oil-fired	Total
Less than 50,000	—	9,306	1,590	10,896
50,000 to 74,999	—	21,700	270	21,970
75,000 to 99,999	18	41,734	5,059	46,811
100,000 to 124,999	26	39,736	20,551	60,313
125,000 to 149,999	18	16,139	21,002	37,159
150,000 to 199,999	19	12,822	15,539	28,380
200,000 to 249,999	2	8,627	4,850	13,479
250,000 to 449,999	6	5,930	4,567	10,503
450,000 to 949,999	—	1,909	2,066	3,975
950,000 to 1,549,999	—	873	1,155	2,028
1,550,000 and over	—	431	1,915	2,346
Total	**89**	**159,207**	**78,564**	**237,860**

127,305 units, according to the Gas Appliance Manufacturers Association (GAMA). The total in 1982 was 103,500 units.

In November, 1984, GAMA's members forecast that oil furnace shipments in 1985 would fall back to the 127,000 level of 1983. We disagree, primarily because of the continuing strong consumer demand and the fact that this product is replacement- rather than construction-oriented. Look for shipments of about 150,000 units this year.

GAMA has advised The News that its totals for oil furnaces now include the total industry. The Bureau of the Census reported that 123,363 oil furnaces were shipped in 1983, the latest year for which figures are available, up 13.1% from the 109,036-unit total shipped in 1982.

The continuing strength of the new home market, together with a conventional replacement market helped significantly by the urge to improve efficiencies, have helped **gas furnace shipments** to reach a total of 1,849,200 units in 1984, an 11.3% increase over the respectable total of 1,661,765 units shipped a year earlier.

It must also be remembered, however, that gas furnace shipments last year were almost at the 1979 level after sinking, during the recession, to 1.15 million units in 1982.

GAMA members last November forecast that gas furnace shipments in 1985 will decrease by 1.7%. With the advantage of several months, we feel that shipments of gas furnaces will hold even this year — with the losses in new home construction balanced by replacement gains.

Gas-fired unit heater shipments in 1984, after several years of decline, increased by 35% to 164,743 units. The total for 1983 was 122,022 units. Of the total, 94% are propeller fan types and 6% are blower types. This market should show at least 10% growth again in 1985.

It should be noted, too, that the Bureau of the Census reported 1983 gas-fired unit heater shipments of 222,661 units, up 7.5% from the 207,162 units shipped in 1982. They are the latest figures available from that source and, obviously, include manufacturers that do not participate in GAMA's program.

Gas-fired duct furnace shipments increased by 16.5% in 1984 to 19,703 units. The total for 1983 was 16,912 units. This product category, too, should increase by about 10% this year.

Gas-fired residential wall furnace shipments in 1984 totaled 179,310 units, up 6.5% from the 168,310-unit total for the previous year. Of the total, 68.7% were vented wall furnaces and the remaining 31.3% were direct-vent systems.

The latest Bureau of the Census figures, which also include commercial and industrial wall furnaces, show a total of 311,572 gas-fired wall furnaces were shipped in 1983, up 35% over the 230,916-unit total for the previous year.

Shipments of **recreational vehicle heating systems** in 1984 totaled 190,470 units, an increase of 8.2% over

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the 176,103 units shipped in the previous year. GAMA reports these shipment figures are not expanded to include the whole industry. The category includes both direct-vent wall and direct-vent central furnaces.

Shipments of **gas-fired floor furnaces** totaled 20,825 units in 1984, up 10.9% from the 18,775 floor furnaces shipped in 1983, according to GAMA.

The Bureau of the Census reported that 24,092 gas-fired floor furnaces were shipped in 1983, the latest year for which figures are available, up 3.4% from the 23,295 units reported shipped in the previous year.

Some perspective

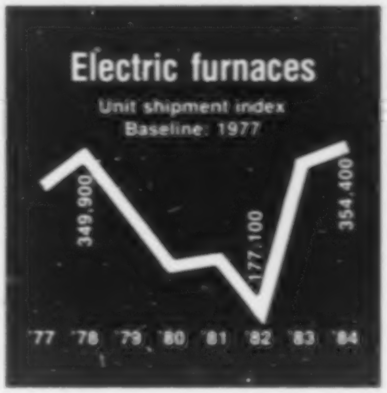
Although it is covered more completely in "Comfort in construction," we should point out here that the volatility of fuel prices that has been a characteristic of the furnace market for several years, appears to be settling down to a point where marketers can count on some stability.

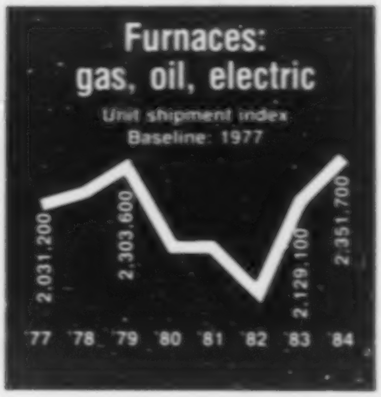
When the second major escalation in world oil prices impacted the U.S. in 1978, along with the sudden availability of natural gas after nearly a decade of curtailments, there was a wave of conversions to natural gas from oil and from electricity dependent on oil for its generation. The decontrol of oil prices in 1981 added fuel to the conversion fire.

This wave of conversions subsided in the early 1980's, a victim of the recession and of a rising tide of natural gas price increases that ranged as high as 50% a year in the wake of increases in the controlled price of interstate natural gas. Too, there was much talk about decontrolling the price of natural gas before the 1985 scheduled date.

Early in 1983, however, the price of natural gas edged past the price of residual fuel oil on a Btu-equivalent basis in many sections of the country. Major industrial users, who almost always can fire boilers with at least two fuels, began to switch from natural gas to heavy oil. For the natural gas industry, which sells about 60% of its gas to this class of user, the price ceiling had been reached.

We must hasten to point out, however, that this price ceiling applies to the industrial market. Increases in the price of natural gas to the residential and commercial markets can still be expected — but should not reflect the steep escalation that was the case earlier in this decade.





In fact, natural gas supplies would appear to be more than adequate for the near term. The latest round of gas price decontrol passed almost unnoticed at the beginning of 1985. And, it would appear, the gas industry is lobbying to once again put natural gas under power boilers.

Not considered in this scenario, either, is the impact of the public's move to high-efficiency and ultra high-efficiency furnaces and boilers. (See "Comfort in construction.")

This phenomenon, which has created a whole new market, now is only in its third year. Furnaces with an AFUE (annual fuel utilization efficiency) of 80% or more accounted for 15.4% of shipments in 1983. Last year it was 31%. And not all of these are simple replacements. Homeowners by the thousand today are electing to replace sound but inefficient heating equipment with new units offering much higher efficiencies.

Electric furnace shipments, which tend to follow closely new residential construction, totaled 354,435 units in 1984, in increase of 4.3% over the 339,950 units shipped in 1983. The increase from 1982 to 1983 was 92% and reflected a 60% increase in housing starts. Last year, housing starts increased by only 2.5%.

The primary role of the electric furnace is to serve as a back-up source for air-to-air heat pumps and as a sole heat source for some homes, mostly in the South.

GAMA expects electric furnace shipments to slip back by about 3% this year to 343,000 units. We think that's about right.

Total **gas, oil, and electric furnace shipments** in 1984 amounted to 2,351,660 units, up 10.5% from the previous year's total of 2,129,020 units.

We feel that the continued strength of the gas and oil furnace replacement markets, together with only a small drop in housing starts, should keep total furnace production about even in 1985.

In addition to the furnaces already reported, the Bureau of the Census reported there were 3,880 **gravity warm air furnaces** shipped in 1983, the latest year for which figures are available. That represents a decline of 18.8% from the 1982 total of 4,776 units. **Forced air furnaces fired by solid fuels** (coal, coke, and wood) shipped in 1983 totaled 7,264 units, down 18.7% from the 1982 total of 8,933 units.

Similarly, the Census Bureau reported shipments of **electric unit heaters** in 1983 totaled 38,240 units, down 24.9% from the revised 1982 total of 50,917 units. **Electric infrared heater shipments,** in 17,818 units in 1983, were down 37% from the year-previous total of 28,280 units.

Shipments of **electric duct furnaces,** at 26,661 units in 1983, were down 22.5% from the 1982 total of 34,396 units. Shipments of **electric baseboard,** except glass panel types, in 1983 totaled 2,075,163 units, up 8.4% from the 1,914,358 shipped the previous year. Shipments of electric air space heaters other than baseboard in 1983 totaled 1,368,233 units, up 17% from the year-previous total of 1,169,717 units.

Oil burners

Oil-burner installations in 1984

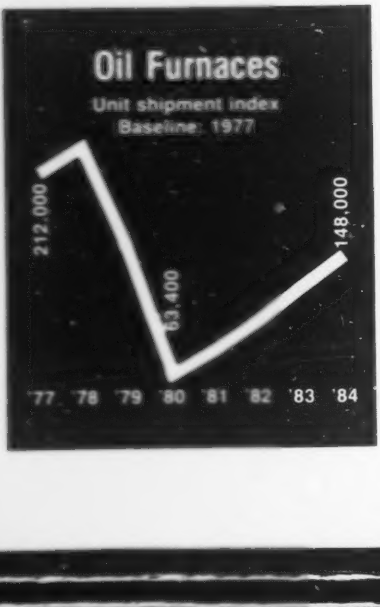
totaled 510,000 units, up 1.1% from the 504,236 units shipped in the previous year, according to Fuel Oil/Oil Heat and Solar Systems magazine.

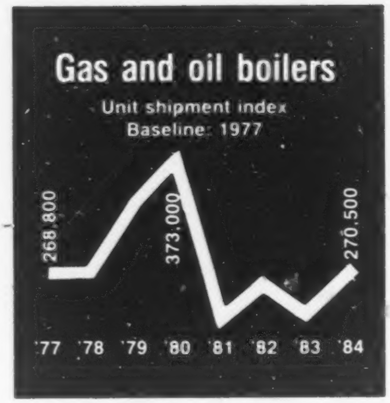
Of these, 57,369 were installed in new single-family homes last year, up 56.6% from the 36,625 oil-fired systems installed in new homes in 1983. New home installations totaled 85,000 in 1979.

The potential for oil-fired systems is limited, in large measure, by the regionality of its distribution system. Although oil had a 16.5% share of the single-family heating market in the Northeast last year, the Northeast accounted for only 11% of the new homes built. Oil captured only 0.9% of the North Central new single-family home market and practically zero in the South and West. The penetration nationally was 2.1%. In the multifamily market, oil captured 12.1% of the Northeast market, almost zero elsewhere, and 0.8% of the national new multifamily home market.

There were 443,690 **replacement oil burners** shipped in 1984, down 3.8% from the 461,291 replacement burners shipped in 1983. The magazine estimated that more than 80% of these were retention-head or other high-efficiency burners which were used to replace less efficient burners on a voluntary (simply to save fuel) or involuntary (breakdown) basis.

Conversions to oil from other fuels in 1984 were estimated at 9,000, down 3.4% from the 9,320 estimated for 1983. Most of these are conversions from electricity although, where natural gas is imported, some have converted to oil. Conversions from oil to natural gas, which approached 300,000 in 1980, are not considered a significant market factor today.





The Bureau of the Census reports that 25,607 **commercial and industrial oil burner units** were shipped in 1983, the latest year for which figures are available, down 26.1% from the 34,662 units shipped the previous year.

Replacement oil burner shipments for commercial and industrial applications in 1983 totaled 20,338 units, down 30.5% from the 1982 total of 29,274 units. There was no breakdown of the low- and high-pressure atomizing types. In previous years, they have been almost evenly split.

The Census Bureau also reported 3,001 **oil-fired floor and wall furnaces** were shipped in 1983, up 1.8% from the total of 2,949 units shipped the previous year.

The American Boiler Manufacturers Association (ABMA), which in past years supplied limited statistics on the industrial, commercial, and power boiler markets, could offer no help in 1985.

A year ago, ABMA reported that its members expected to ship power boilers with a total capacity of 2,060 MW to the U.S. domestic market in 1984. Power boiler exports were expected to total 1,500 MW.

ABMA expected to ship industrial boilers in 1984 with a total capacity of 19.3 million pounds of steam per hour, about 30% below historic averages. The 1984 totals for commercial fire tube boilers were expected to be 513,000 hp and 7,230 million Btu.

The bureau also reported that 409,449 residential replacement oil burners were shipped in 1983, up 4.3% from the 392,390 replacement burners shipped the previous year.

Other heating equipment

In order to provide some perspective on the total comfort space heating scene we might point out that, in 1983, the latest year for which figures are available, the Bureau of the Census reported shipments of 1,177,314 domestic heating stoves, down 9.8% from the revised total of 1,305,770 domestic stoves shipped in the previous year. Of these:

- 174,551 were gas-fired, down 9.3% from the 192,384 units shipped in 1982. This category includes radiant units as well as vented and unvented circulating types.
- 265,283 used other fuels — including kerosene, gasoline, fuel oil, and coal. This category was down 28.4% from the total of 370,530 units shipped in 1982.
- The total for wood stoves, at 737,480 in 1983, was down only 0.7% from the previous-year total of 742,854 units. This included 117,368 freestanding fireplaces, down 23.8% from the 153,947 units shipped in 1982, and 203,844 wood stoves, down 12.7% from the 233,519 units shipped the previous year. Of the wood stoves shipped in 1983, about half (47.3%) were circulating types, a third (33.9%) were radiant types, and the remainder (18.8%) were other types.
- Shipments of zero-clearance fireplaces in 1983 made a dramatic 96.1% surge to 252,385 units. The 1982 total was 128,681.
- But fireplace insert shipments, on the other hand, slumped by 27.7% in 1983 to 163,883 units. The total for the previous year was 226,680.

Solar

The Bureau of the Census reported that shipments of solar collectors totaled 186,173 units in 1983, the latest year for which figures are available, down 7.5% from the previous-year total of 201,217 units.

Of the total shipped in 1983, low-temperature collectors designed to operate at temperatures below 110 F ac-

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Each Statistical Panorama includes the latest data available. Sources frequently revise their previous year's figures, which explains apparent discrepancies between the latest and earlier published data. Where sources give significantly varying information, that data is mentioned.

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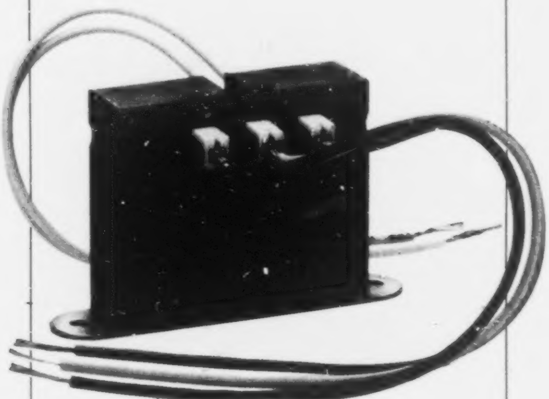

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counted for 40.4%, or 75,152 units. The total, which represents about the same proportion of the total as the previous year, was down 9% from the total of 82,557 low-temperature units shipped in 1982.

It might be noted that, although low-temperature collectors represented 40% of the units shipped in 1983, they also only represented 22.3% ($12.5 million) of total solar collector shipment value ($56 million). Medium-temperature collectors, which operate between 100 and 180, accounted for the remaining 77.7% ($43.5 million) of total shipment value.

Of the 111,021 medium-temperature collectors shipped in 1983, down 6.4% from the total of 118,660 medium-temperature collectors shipped the previous year, 10.2% (11,274 units) were air collectors and 89.8% (99,747 units) were liquid collectors. These percentages were roughly comparable to those of the previous year.

No figures were available for high-temperature collectors operating at temperatures above 180, including concentrating and evacuated-tube collectors, because they might disclose figures for individual companies. Too, there are no reliable figures for total U.S. photovoltaic shipments.

The solar collector record, in units:

1978	170,611	
1979	226,659	up 33%
1980	303,102	up 34%
1981	254,768	down 16%
1982	201,217	down 21%
1983	186,173	down 7.5%

Total copper shipments for solar heating systems increased by 8% in 1983 to 18.1 million pounds from 16.8 million pounds in 1982, according to the Copper Development Association (CDA).

Copper used in medium-temperature liquid collectors rose by more than 13%. The use of copper in strip and sheet form in solar collectors increased to 6.1 million pounds in 1983, up from 5.7 million pounds in 1982.

Copper tube used in addition to collectors, such as hook-up tube and in heat exchangers, totaled 4.9 million pounds in 1983. Copper tube amounted to 4.6 million pounds and valves, wiring and other uses totaled another 2.5 million pounds of copper.

Related products

Sales bookings for industrial air pollution control equipment, which peaked at just over $1 billion in 1979, have continued to spiral downward precipitously, according to the Industrial Gas Cleaning Institute (IGCI).

Total new orders for 1984 amounted to $200.7 million, down 27.2% from the $275.6 million in new orders reported for 1983.

The booking value of electrostatic precipitators, at $70.6 million in 1984, represented a 183.5% increase over the $24.9 million in bookings a year earlier.

Fabric filter bookings, at $56 million last year, were up 56.4% over the 1983 total of $35.8 million.

But flue gas desulphurization equipment bookings, at $191.7 million in 1983, dropped 80.6% last year to only $37.2 million. The level of bookings in this category in 1979 was $404 million — or 40% of the industry total.

The value of gaseous emission controls bookings in 1984 was $7 million, up 14.8% from the year-previous total of $6.1 million.

Mechanical collector booking values, at $12.5 million in 1984, represented a 48.8% increase over the $8.4 million total recorded in 1983.

Wet scrubber bookings, at $17 million last year, represented a 95.4% increase over the $8.7 million total for 1983, according to IGCI.

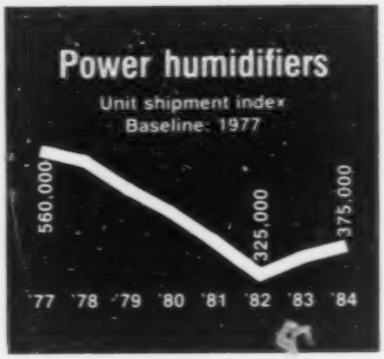
The institute statistics cover new orders for installations in the U.S. and Canada. All orders include bare flange-to-flange hardware with the exception of flue gas desulphurization equipment, which includes the total contract value.

Power humidifiers

Power humidifier shipments, which ranged around the half-million mark in the mid-1970's, have declined for both economic and technological reasons in recent years. But the game is far from over.

We feel that power humidifier shipments increased from 350,000 units in 1983 to 375,000 units last year, a 7% increase that came hard on the heels of an 8% increase a year earlier. We expect shipments to hold even in 1985.

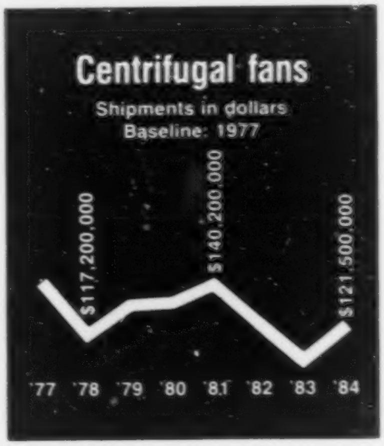
Although approximately nine out of ten power humidifiers are installed in existing homes and only about 10% go into new homes, they often are installed soon after a new or used home is purchased by people who, for reasons of health or comfort, feel they want the benefits of humidification.



Power humidifier shipments suffered through the recession when the sales of both new and used homes were low. And although there has been some improvement, the growing number of tightly insulated homes is likely to limit the humidifier's potential in future years. Because infiltration rates are so low in these homes, fixed ventilation rates or dehumidifiers are needed to get rid of humidity build-up in the home.

An Energy Information Administration study published in 1984 and covering 1982 U.S. housing characteristics revealed that 11.3 million, or 13.5%, of the nation's 83.8 million all-year homes are equipped with humidifiers.

The largest humidifier concentration is in the North Central region where 6.3 million homes, or 29.7%, are equipped with humidifiers. The Northeast region follows with 2.5 million homes, or 13.7%. As might be expected, only 1.7 million homes in the South, or 5.9%, and only 800,000 homes, or 5%, in the West are equipped with humidifiers.



Looked at another way, only 2.7 million city homes, or 9.2%, are humidified while 5.1 million suburban homes, or 15.1%, are humidified. Of rural homes, 3.5 million, or 16.8%, are equipped with humidifiers.

For the record, the Bureau of the Census reported that 324,948 central and self-contained humidifiers were shipped in 1983, the latest year for which these figures are available. That's a 4.7% increase over the 310,342 units shipped the previous year.

Fans

Both the Air Movement Division and the Air Control Division of the Air Movement and Control Association (AMCA) reported improved business conditions last year although, in a couple of categories, the dollar differences were not that great.

Shipments of centrifugal fans, at $121,527,387 in 1984, showed a 16% increase over the previous year's total of $104,881,342.

Industrial axial and propeller fan shipments, at $55,230,462 last year, were 5% more than the $52,755,570 worth shipped in 1983.

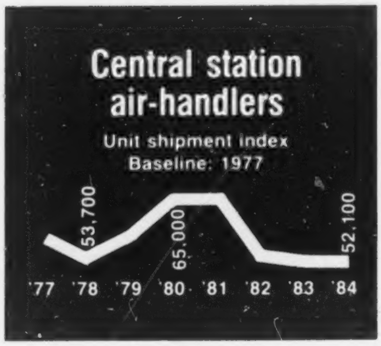
The value of power roof ventilator shipments in 1984 was $65,882,433, an increase of 15% over the total of $57,157,440 worth shipped in 1983.

Shipment values for louvers, dampers, and shutters, at $52,820,840, were just 3% over the $51,475,125 total recorded the previous year.

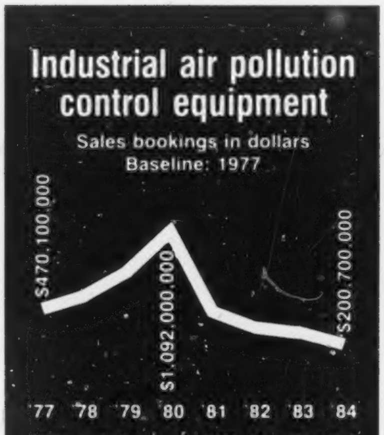
AMCA in 1978 eliminated fans shipped to the power generation market and placed them in another category that is not reported publicly.

Central station air handlers

Shipments of central station air handlers held steady in 1984. The total for last year was 52,100, or only 0.6% below the 52,400 total recorded in 1983. The outlook is for another steady year in 1985.

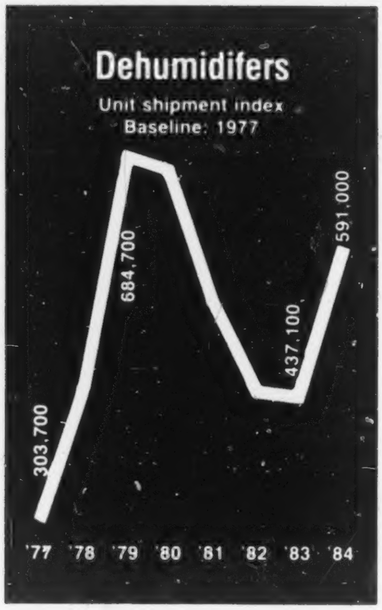

Central station air-handlers

Unit shipment index
Baseline: 1977


Industrial air pollution control equipment

Sales bookings in dollars
Baseline: 1977

This graph is one-fifth the vertical rise of the accompanying graphs.


Dehumidifers

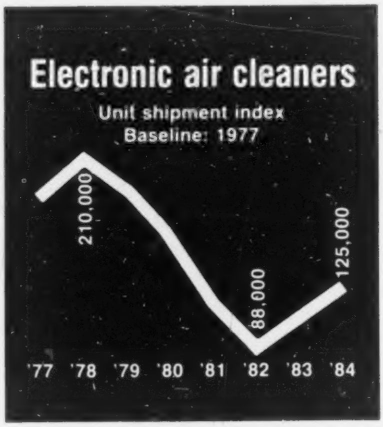
Unit shipment index
Baseline: 1977

Electronic air cleaners

Total shipments of electronic air cleaners (eac's) improved by 16.2% last year to 125,800 units. The revised total for 1983 was 108,300 and marked the first increase in eac shipments since 1978.

Although the improvement in housing activity was credited with most of the improvement in the eac market; manufacturers hope that increased public attention to indoor air quality will bring eac's out of the marketing doldrums.

In addition to cleaning all but a trace of airborne dust and pollen from indoor air, eac's also do a creditable job on the worrisome indoor pollutants radon and formaldehyde. The electronic air cleaner also has a special compatibility with heat pumps because of its ability to keep the indoor coil clean in winter when it runs under dry conditions.


Electronic air cleaners

Unit shipment index
Baseline: 1977

Not to be forgotten, however, is the negative impact of homeowners who spend to the limit of their budget to replace an old furnace with a high-efficiency unit. That extra cost for efficiency could eat up discretionary amounts that might have been spent for humidifiers and electronic air cleaners.

Looking ahead, we see a flat year in 1985 for eac's.

Dehumidifiers

Shipments of dehumidifiers, which reached a peak of 684,700 units in 1978, increased by 35.2% in 1984 to 591,000 units. The total for 1983 was 437,100 units, according to the Association of Home Appliance Manufacturers (AHAM).

It might be noted that, in its last report, the Bureau of the Census, reported that 610,179 dehumidifiers were shipped in 1983, the latest year for which figures are available. That's a 39% increase over the 438,833 units the bureau reported shipped in the previous year.

Comfort and construction

There was a time when the efficiency of an air conditioner, a heat pump, a furnace, or a boiler was largely an academic consideration. Those who made or sold equipment with efficiencies markedly ahead of the competition could find few who appreciated the difference enough to pay the premium cost.

No more.

The manufacturer or wholesaler-distributor no longer can serve the market with equipment of any single efficiency. Virtually all offer two efficiency ranges and many find that, with the threat of separate state mandatory minimums hanging over the market, three efficiency ranges is a safer bet.

At the risk of being tiresome, we might point out that, back in 1980, we

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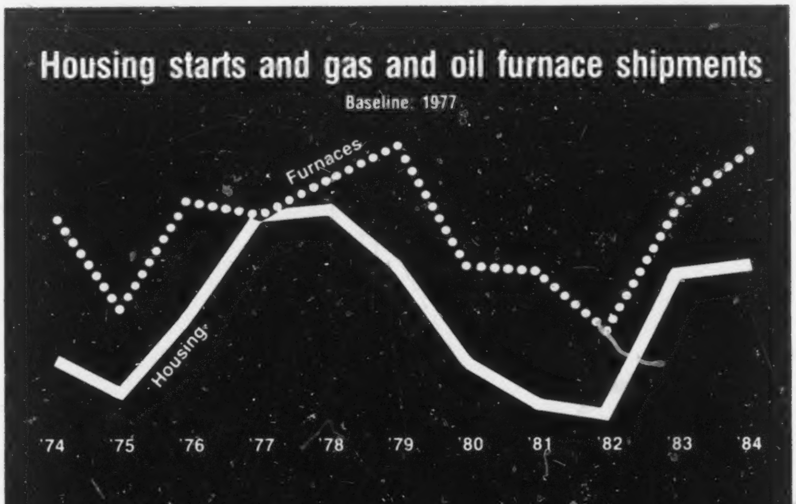
advanced a theory that the U.S. already was well advanced in the first of three transitional phases in which influences related to energy cost and availability were triggering significant changes in the marketing of home comfort systems.

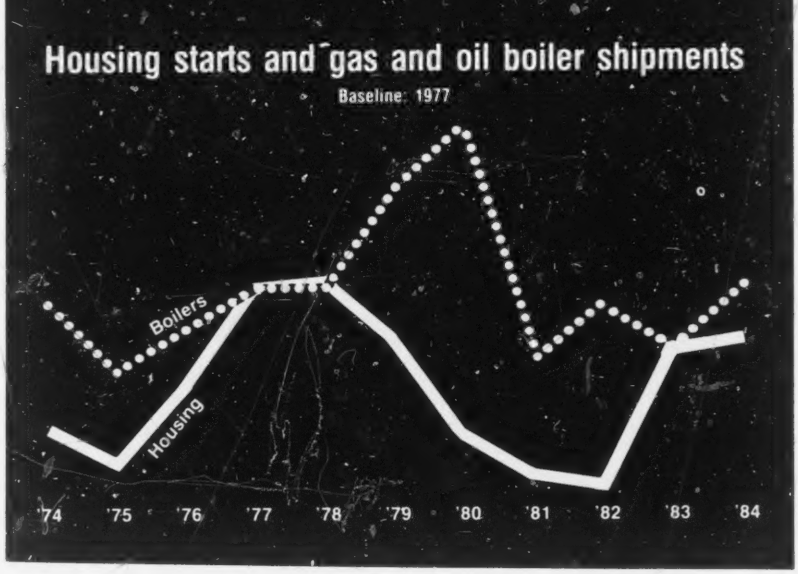
The first phase was an awareness of the need for change to avoid needlessly high energy costs. It took the form of added insulation, weatherization, the elimination of pilots on gas-fired equipment, and an interest in solar and other renewable energy sources.

The second phase — departures from traditional equipment to designs based on new technology and a growing consumer willingness to pay more for higher efficiencies — had its beginnings in 1979 but did not develop fully until 1984.

The third phase, as we see it, began about 1983, and will be evident for the forseeable future. It's a time when consumer and government education is largely complete so that the job of providing substantially more efficient comfort heating-cooling systems can go forward according to the natural dictates of the marketplace.

Industry is both on time and on target. The consumer has demonstrated an unexpectedly high degree of understanding whether or not added incentives were offered. Government, too, is generally moving in the right direction but, characteristically, there are a handful of states that do not believe a free market can do the job.


Housing starts and gas and oil furnace shipments
Baseline: 1977


Housing starts and gas and oil boiler shipments
Baseline: 1977

Heating

In the days of cheap and abundant natural gas, there was little incentive to purchase anything better than an inherently reliable and inexpensive atmospheric gas furnace or boiler with a standing pilot that, in most cases, burned all summer to keep rust and dampness from the simple clamshell heat exchanger.

These atmospheric furnaces and boilers had a steady-state efficiency of 80% but, on an annual basis, they had to press hard to achieve efficiencies in the 60% range. A major part of the problem was a natural venting arrangement that vented conditioned air up the flue whether the heating unit was running or not.

With the first stage of natural gas decontrol in 1978, which reversed the increasingly severe gas service curtailments over the previous decade, came steep price increases that have more than doubled gas costs, in real terms. The first solution, made mandatory in some states, was an intermittent ignition device (iid) to replace the standing pilot. This increased seasonal efficiencies to the 67% to 71% range and a vent damper, which reduced the amount of conditioned air vented between cycles, could add another 8% or so.

The next stage was a family of furnaces with power burners, induced draft, or recuperative heat exchangers that established a new high-efficiency class with seasonal efficiencies in the 80% to 86% range. They stopped just short of condensing the flue gases.

A pulse combustion boiler was introduced to the market in 1980 and, two years later, it was joined by a pulse combustion furnace and other condensing designs that produced seasonal efficiencies in the mid-90% range. A new heat pipe furnace design, for example, needs only to add more heat exchanger surface to move it from noncondensing to ultra high-efficiency condensing operation.

A new market

These developments have been watched with more than passing interest by consumers eager for ways to control fast-rising fuel bills. Within the past three years, a whole new furnace market has evolved that centers around the replacement of inefficient equipment in good working order for the sake of efficiency.

In fact, 1984 was the first year in which consumers had anything like a full selection of efficiencies from nearly all manufacturers.

A breakdown of manufacturer shipments by efficiency range reported by the Gas Appliance Manufacturers Association (GAMA) illustrates the dramatic change in consumer buying habits.

In 1983, a total of 443,740 gas furnaces, or 26.7% of total shipments, had seasonal efficiencies below 65%. These were the conventional furnaces as recently as four years ago. Last year, shipments of residential furnaces with annual fuel utilization efficiencies (AFUE's) of less than 65% totaled 350,390 units, or only 19% of shipments.

At the other end of the spectrum, 256,120 gas furnaces shipped in 1983, or 15.4% of the total, had AFUE's of 80% or better. Last year that percentage had doubled to 31% and the total had swelled to 574,595 units.

Looked at another way, the number of gas furnaces shipped in 1983 in the 80% to 86% AFUE range amounted to 139,315 units, or 8.4% of the total. This class swelled to 368,545 units last year, or 19.9% of the total for a 164.5% increase.

Similarly, gas furnace shipments in the above-86% AFUE condensing range increased by 76.4% from 116,805 units, or 7% of the total, in 1983 to 206,050 units, or 11.1% of the total, last year.

Other figures supplied by GAMA showed that the picture for oil-fired furnace shipments was a bit different. The 30,830 oil furnaces shipped in 1983 with AFUE's of more than 80% amounted to 24.2% of total shipments. The number in this category grew to 47,645 units, or 32.2% of total shipments, last year.

Oil-fired furnaces with annual efficiencies of less than 75%, however, also grew from 7,505 units, or 5.9% of shipments, in 1983 tc 12,470 units, or 8.4% of shipments, last year.

Looking ahead, it would appear reasonable to assume that, this year, 40% of both gas- and oil-fired furnaces will have AFUE's of 80% or better. Only four years ago, the percentage was probably less than three. It must be remembered, too, that this was accomplished without incentives and almost wholly by natural market demand.

If there is a cloud on the horizon, it is the problem of condensation within the venting system of noncondensing furnaces in the 83% to 86% seasonal efficiency range, and in the heat exchangers of condensing furnaces that use indoor air for combustion.

The problem, premature corrosion of heat exchangers and venting systems, is caused by residual sulfur in natural gas and a wide range of contaminants in indoor air that produce acids in the

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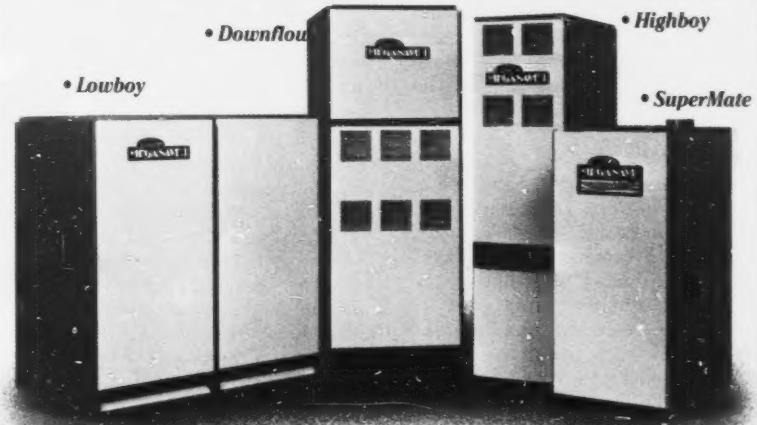

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condensate that attack furnace components and masonry chimneys.

On the brighter side, both the research community and the furnace manufacturers are aware of the potential of this problem. Partial solutions include new plastic venting systems and standards, better stainless steel formulations for heat exchangers, and furnace designs that make sure unintended flue gas condensation does not occur in either furnace vent components or outside-wall masonry chimneys. Some designs use outdoor air for combustion on grounds it is more predictable and has much less corrosion potential.

Elsewhere on the heating front, it's estimated that eight of ten oil burners sold today are flame-retention head or other high-efficiency types. Oil furnaces and boilers, which were almost knocked out of the market by the second oil price shock in 1978-1979, are making a modest comeback in the Northeast.

Cold weather

Despite the severe cold that swept through the nation, particularly the South, in January, the National Oceanic and Atmospheric Administration's climate impact assessment report stated that below-normal population-weighted heating degree days accumulated through December dominated the October, 1984, through January, 1985, heating season.

In other words, national comsumption of natural gas, oil, and electricity for heating is 6% to 7% below normal for the four-month period. The average heating customer's bill for the period was $9 (2%) below normal and $26 (6%) below last season's cost.

All of this aside, temperatures of 2° to 12°F below normal over almost all of the country in January produced the eighth greatest temperature-related heating demand nationally since 1932 when records were first kept.

The national residential heating bill was estimated at $12 billion in January, $1.3 billion (12%) above normal and $800 million above the January, 1984, bill. This neutralized the $18 savings from December, 1984. National consumption of natural gas, oil, and electricity for heating was 10% (oil) to 17% (electricity) above normal.

There was no escape in January. All areas of the country reported increases of 6% or greater. Many average state and regional customers saw temperature-related fuel bill increases of 20% or more. February statistics, although not available, are expected to be almost as bad.

During the period April, 1982, through March, 1983, the Energy Information Administration (EIA) reported that the nation's 83.8 million homes consumed 8.62 quads (quadrillion Btu) of energy costing $87.8 billion. Of this total, 4.77 quads worth $27.1 billion was natural gas, 2.42 quads worth $48.4 billion was electricity, 1.14 quads worth $9.6 billion was fuel oil or kerosene, and .029 quads worth $2.7 billion was LPG (liquefied petroleum gas). The 5.6 million homes that used wood as the main heating fuel consumed 0.3 quads worth $4.4 billion.

Of the total number of homes, 29.4 million homes were located in central cities, 33.8 million were in the suburbs, and 20.6 million were rural. Also, 53.9 million were owner-occupied and 29.8 million were rented. Looked at another way, 30.6 million were built before 1950, 40.2 million were built between 1950 and 1974, and 12.9 million were built after 1974.

To heat their domestic hot water, 47.1 million homes used natural gas, 26.6 million used electricity, 5.7 million used fuel oil or kerosene, and 4.4 million used some other means.

EIA reported that 21.1 million homes used 43.9 million cords of wood during the 1982-1983 winter. But of the total number of homes, only 5.5 million used wood as the main heating fuel. Looked at another way, 13.7 million homes burned less than two cords of wood, 4.3 million used two to four cords, and 3.1 million homes used more than four cords of wood.

In another EIA study of 1982 Housing Characteristics published last year, the administration attempted to quantify both the number of households that had made energy conservation improvements in the period September, 1980, through November, 1982, and the reasons for making them.

For example, 16.8 million homes did some caulking (77% to save money, 27% for comfort reasons, 11% because they were making home improvements anyway, 4% for tax credits, and 2% because of an energy audit). The 12.7 million homes that did some weatherstripping were motivated 81% for money-saving and 31% for comfort reasons.

Significantly, energy audits played a very minor role in energy conservation decisions during the period except for water heater insulation (10%), electronic ignition for furnaces (10%), flue dampers (15%), flame-retention head oil burners (7%), and additional heating equipment (10%). Tax credits played a similar role in these categories and in ceiling-wall insulation.

The study indicated that 7.6 million homeowners made heating system changes (62% to save money, 38% for comfort, and 29% because they had to replace them). Of the replacements, 2.5 million used the same fuel and 1 million used a different fuel. Of the additional systems, 400,000 used the same fuel and 1.9 million used another fuel. The other fuels were not specified.

In the same period, homeowners: Added 3.4 million woodburning stoves (84% to save money, 44% for comfort); 7.4 million storm doors; 7.4 million ceiling or roof insulation; 3.4 million wall insulation; 5.8 million storm windows; 2.4 million basement crawl space insulation; 1.7 million insulated ducts and 3.1 million insulated pipes; 2.2 setback thermostats; 1 million flue dampers; 600,000 flame-retention head burners, and 4.3 million added shutters, drapes, or window film.

Of the 1.4 million who installed central air conditioning, 27% said it was to save money, 47% said it was for comfort reasons. Of these, 800,000 were replacements. But the remaining half-million who added central cooling for the first time, 22% said it was to save money and 72% said it was for comfort reasons. Of the 300,000 who installed heat pumps, however, 56% did it to save money and 44% did it for comfort reasons.

The survey indicated that, of 64.8 million homes with heating controls and the heat turned on in the daytime, exactly half (32.4 million homes) turned the heat down at night.

It also attempted to show the number and location of equipment seldom cataloged. For example, it reported 11.3 million homes have humidifiers, 2.5 million in the Northeast, 6.3 million in the North Central region, 1.7 million in the South and 800,000 in the West. Similarly, it said 7.5 million homes have dehumidifiers, 2.4 million in the Northeast, 3.9 million in the North Central region, 1.1 million in the South, and 100,000 in the West.

Of the 3.6 million homes with evaporative coolers, 2.8 million are located in the West. Another 600,000 are lo-

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Heating-cooling-fuel new home characteristics

(Based on two quarters revised, one quarter preliminary Census Bureau figures. All numbers are rounded.)

	1983					1984				
	U.S. total	Northeast	North Central	South	West	U.S. total	Northeast	North Central	South	West
Single-family homes completed	**641,000**	74,000 11.5%	91,000 14.2%	336,000 52.4%	141,000 21.9%	**751,000**	85,000 11.3%	110,000 14.6%	379,000 50.4%	177,000 23.6%
Space heating fuel										
Gas	280,000 43.7%	28,000 37.8%	60,000 65.9%	119,000 35.4%	74,000 52.5%	341,000 45.4%	37,000 43.5%	77,000 70%	130,000 34.3%	96,000 54.2%
Electricity	314,000 50.0%	27,000 36.5%	21,000 23.1%	208,000 61.9%	58,000 41.1%	362,000 48.2%	28,000 32.9%	22,000 20%	242,000 63.9%	69,000 38.9%
Oil	14,000 2.2%	12,000 16.2%	2,000 2.2%	— —	— —	16,000 2.1%	14,000 16.5%	1,000 0.9%	— —	— —
Other/none	33,000 4.1%	7,000 9.5%	8,000 8.8%	9,000 2.7%	9,000 6.4%	32,000 4.3%	6,000 7.1%	10,000 9.1%	7,000 1.8%	12,000 6.9%
Heating systems type										
Warm air furnace	361,000 56.3%	25,000 33.8%	67,000 73.6%	187,000 55.7%	81,000 57.4%	419,000 55.8%	29,000 34.1%	86,000 78.2%	201,000 53%	105,000 59.3%
Heat pump	183,000 28.5%	10,000 13.5%	9,000 9.9%	122,000 36.3%	40,000 28.4%	225,000 30%	12,000 14.1%	8,000 7.3%	155,000 40.9%	49,000 27.7%
Hydronic	24,000 3.7%	18,000 24.3%	3,000 3.3%	— —	1,000 0.7%	30,000 4%	25,000 29.4%	3,000 2.7%	— —	— —
Electric baseboard/ panel/radiant	40,000 6.3%	16,000 21.6%	7,000 7.7%	11,000 3.3%	7,000 4.9%	42,000 5.6%	17,000 20%	8,000 9.3%	10,000 2.6%	10,000 5.6%
Other/none	33,000 5.2%	5,000 6.8%	5,000 5.5%	16,000 4.7%	12,000 8.6%	35,000 4.6%	2,000 2.4%	5,000 2.5%	13,000 3.5%	13,000 7.4%
With central air conditioning	449,000 70.0%	23,000 31.0%	44,000 48.4%	303,000 90.2%	77,000 54.6%	537,000 71.5%	28,000 32.9%	62,000 56.4%	350,000 92.3%	97,000 54.8%
Multifamily homes completed	**330,000**	24,000 7.3%	44,000 13.3%	193,000 58.5%	69,000 20.9%	**459,000**	33,000 7.1%	46,000 10%	264,000 57.6%	116,000 25.3%
Space heating fuel										
Gas	94,000 28.5%	13,000 54.2%	28,000 63.3%	23,000 11.9%	30,000 43.5%	121,000 26.3%	14,000 42.4%	25,000 54.3%	34,000 12.9%	47,000 40.5%
Electricity	231,000 70.0%	8,000 33.3%	16,000 36.7%	170,000 88.1%	39,000 56.5%	329,000 71.7%	14,000 42.4%	20,000 43.5%	230,000 87.1%	65,000 56%
Oil	3,000 0.9%	3,000 12.5%	— —	— —	— —	4,000 0.8%	4,000 12.1%	— —	— —	— —
Other/none	2,000 0.6%	— —	— —	— —	— —	5,000 1.2%	1,000 3.1%	1,000 2.2%	— —	4,000 3.5%
With air conditioning	294,000 89.0%	15,000 62.5%	34,000 77.3%	190,000 98.5%	54,000 78.4%	412,000 89.8%	22,000 66.6%	42,000 91.3%	262,000 99.2%	85,000 73.2%

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cated in the South and 100,000 in the North Central states. Another 6.5 million homes have whole-house cooling fans.

Electric furnaces, which for many years replaced electric resistance baseboard and ceiling cable systems, now are playing second fiddle to heat pumps, which have captured an ever-increasing share of the new home market (30% of the new single-family home market last year and about 30% of multifamily home completions). In many heat pump installations, the electric furnace provides the backup heat source.

The initial reason for the popularity of the air-to-air heat pump was the lack of natural gas availability in most markets until 1978. But with more than half of new home construction over the past few years in the South, which requires a lot of cooling and minimal heating, the heat pump retained its popularity. Another major factor was the trend toward condominiums and garden apartments.

A development that has moved slowly in the marketplace is the replacement of split-system comfort cooling units with split-system heat pumps on gas and oil furnaces. The heat pump provides the summer cooling and also provides heating when ambients are above the balance point (the point at which the heat pump can still provide 100% of heating requirements). To get the most economical operation, the cutoff point for the heat pump would depend on the relative price of the other fuels.

Gas utilities dislike the arrangement intensely and have tried, with only limited success, to put demand charges on such installations on grounds that they are required to make gas available when the weather is the coldest and demand is at its peak, yet they lose virtually all of the heating revenue in the spring and fall. Many electric utilities, particularly those with substantial summer peaks, are offering incentives to those who install add-on heat pumps.

Clearly, then, the battle of the fuels has warmed up again.

One study conducted by Kenneth Kazmer, of the Gas Research Institute, and Henry DeLima, of Applied Management Sciences, indicated that a gas furnace with a seasonal efficiency of 65% would produce lower overall heating bills in Chicago and Dallas than a gas furnace and an add-on electric heat pump. Although the gas furnace-heat pump combination would produce modest savings in Atlanta, the payback period was estimated at more than 17 years.

In addition to higher first costs for the heat pump over a central air conditioner, they argued that the higher delivered air temperature from the gas furnace (140°F) than the heat pump (90° to 115°F) results in a higher comfort level. Both the gas furnace and the split-system air conditioner have a longer service life than the heat pump.

Other gas industry authorities report that the gas furnace-heat pump combination becomes even less competitive if higher furnace efficiencies are involved, primarily because standby furnace losses all but disappear at the highest furnace efficiencies.

The heat pump, however, still has a magic about it that the gas industry envies. It has devoted a lot of time and money to the development of a gas-fired heat pump that can compete with electric heat pumps on an installed cost and operating cost basis.

Although technically feasible now, the Gas Research Institute reports that a gas heat pump still is some years away because, in order to justify the anticipated first-cost premium, it must be more efficient than its electric counterpart. And with the efficiencies of electric units moving steadily upward, they make for a difficult moving target.

Even though they are sold in much fewer numbers than other heating systems, water-source heat pumps are making themselves felt in some northern markets. They have been used in the South, particularly in Florida, for many years.

Most of the early "cold water" units used water from a well, a pond, or the ocean. Water quality and quantity usually was unknown until the job was started and often a second return well had to be drilled. For these reasons, water-source heat pumps were largely a rural phenomenon.

Within the past three years, however, researchers and some enterprising entrepreneurs have developed vertical and horizontal closed-loop designs using plastic pipe and a water-glycol solution that substantially reduced drilling costs and makes the system practical for a city lot.

These systems provide ultra high-efficiency cooling and efficient heating without the need for backup heating. But the high first cost — about two to three times the cost of a high-efficiency gas furnace — and the individual engineering required promises to limit the market.

Although many states have banned the installation of gas furnaces with standing pilots, the U.S. Department of Energy (DOE) has determined that mandatory minimum efficiency standards for furnaces and boilers are not necessary. Labels and fact sheets that show potential buyers the relative efficiencies of these units are, however, required by the Federal Trade Commission (FTC).

About half of the states are not happy with this arrangement and have petitioned DOE for exemption from the no-standard standard so they can set their own minimums, a move being strongly resisted by manufacturers who would face the task of meeting multiple efficiency standards.

It might be noted, too, that a poll of 3,300 home buyers released by the National Association of Home Builders (NAHB) showed that 74% of respondents considered energy efficiency "very important" when considering a new home purchase.

Cooling

In the late 1960's and early 1970's condenser surfaces on central air conditioners got smaller and smaller and condenser fan speeds got higher and higher as manufacturers tried to hold the line on price in a competitive market dominated by builder purchases. The EER's (energy efficiency ratios) didn't matter so long as the first cost was low. Electricity was cheap and, after all, the builder didn't have to pay the utility bills.

But as electricity costs spiraled upward, particularly in the South where cooling seasons are long, the industry began developing equipment to meet a growing new market. In the early stages, the builder market held to the low-cost, low-efficiency units. But manufacturers developed equipment with higher efficiencies for the replacement and add-on markets where consumers were more knowledgeable and more demanding

Condenser surfaces soon were expanded and multiple-speed condenser fans were added, moves that made outdoor units much quieter as well. The push by a growing number of municipalities for sound ordinances to control air conditioner noise, particularly noticeable in the early 1970's, all but disappeared. A contributing factor was the fact that, as air conditioning penetration grew, more windows were closed at night.

Compressors were improved and two-speed models were offered by several manufacturers. Larger commercial equipment began to routinely come equipped with multiple compressors to provide more modulation and, coincidentally, provide lower first cost benefits because of economies of scale for the smaller compressors.

The performance of heat pumps, particularly in northern locations, was improved. The abnormally cold weather in the South this past winter, however, left some doubt that the backup heat sizing rules used by many are adequate — a problem of system rather than equipment design. Cooling performance, although still a compromise, was upgraded to a point where it rivalled the best straight cooling units.

Heat pump compressors were beefed up to better take the rigors of more defrosts in harsher northern climates. Defrosting methods and controls were improved. Some designs closely approached demand defrost and one deluxe design even included an inverter drive.

According to our records, these moves started to show in the marketplace in 1973, which meant that laboratory work and field tests were going on long before that. We arbitrarily picked an EER of 7.5 as the line separating high-efficiency equipment from the rest. Until 1976, we doubt that much more than 15% of the equipment shipped was in that category.

That picture has changed dramatically.

The Air-Conditioning and Refrigeration Institute (ARI) reported that, in 1984, the sales-weighted average of all cooling-only unitary equipment of 65,000 Btuh and under was 8.66 SEER (seasonal energy efficiency ratio), up 2.7% from 8.429 SEER a year earlier.

Similarly, the sales-weighted average for all unitary heat pumps in the same size range shipped last year was 8.419 SEER, up 2.2% from the 8.234 SEER average recorded in 1983.

When records of this type first were kept in 1976, only 10.6% of heat pumps had an EER of 7.5 or better. Only 4.5% of the heat pumps shipped that year could boast of an EER of 8.5 or better. In 1983, 86.5% of heat pumps under 65,000 Btuh had an SEER of 7.5 or more, and 19.1% had an SEER of 8.5 or better.

By the same token, only 28.2% of cooling-only split-system air conditioners of 65,000 Btuh or less shipped in 1976 had an EER of 7.5 or better. Also in that year, 6.3% could meet or top an EER of 8.5 and 0.02% were above 9.5. In 1983, 82.55% of split-system cooling-only units in that size range had an SEER of 7.5 or better, 41.6% could meet or top an SEER of 8.5, and 7.12% could meet or top an EER of 9.5.

Although some states such as Cali-

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fornia and New York have established mandatory minimum efficiencies for comfort cooling equipment, we doubt that these regulations have had more than a minor impact on raising the overall efficiencies of national shipments. The progression upward simply has been too regular, with no sudden shifts when state regulations came into force.

A major factor in the acceptance of higher comfort cooling efficiencies, at their significantly higher first cost, has been the magnitude of incentive programs launched by summer-peaking electric utilities seeking to postpone the addition of more generating capacity. They find it less expensive to pay a homeowner or contractor $300 to $400 for installing high-efficiency equipment than to pay up to $1,500 a peak watt for new power plants.

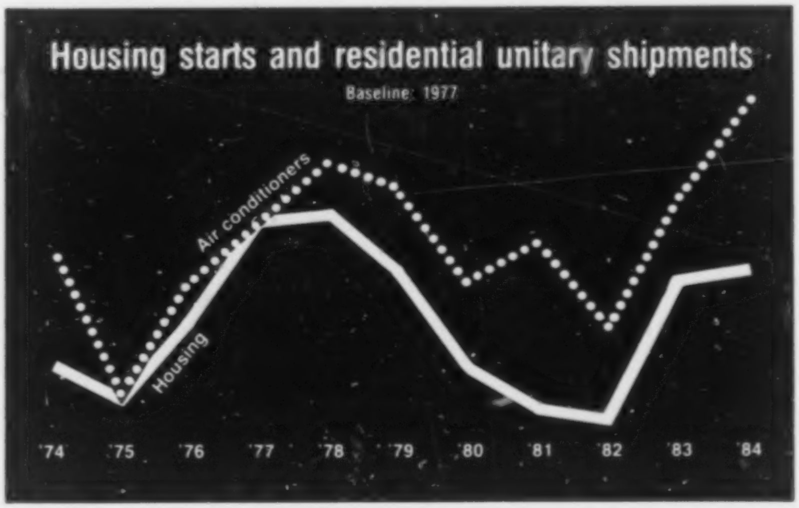
Because of these incentives, homeowners have been recovering a large portion of the first-cost premium for high-efficiency equipment. In fact, industry shipment statistics would appear to indicate that many have been replacing inefficient equipment in essentially good working order so they can lower their operating costs.

At last report, about 50 electric utilities were offering incentives of some type. This number is unlikely to grow much larger because, as some utilities initate new programs, others will be dropping out, their mission accomplished.

There are strong indications, also, that the homeowner does not always require a monetary incentive from a utility or on his or her tax return to make a wise choice. This is borne out by the overall record of the comfort cooling and heat pump markets, which show higher average efficiencies than either utility incentives or state minimums can explain, and by the remarkable record of comfort heating equipment over the past three years now that high-efficiency choices are widely available.

Remember, too, that the comfort heating industry has not had any help from utility incentive programs or from any meaningful state minimums.

Even though the Department of Energy has mandated that national mandatory minimum efficiency levels for home comfort heating and cooling equipment are not necessary, 23 of the 50 states have petitioned for the right to set their own minimums.



New York put into effect a 9.5 SEER standard for central air conditioners last September even though state officials admit they can't enforce it. California has decided to raise its mandatory minimum from 8 SEER to 8.9 SEER on Jan. 1, 1988, and to 9.9 SEER on Jan. 1, 1993.

In addition, California is studying the possibility of mandatory minimums for packaged terminal air conditioners, room units, and commercial air conditioners. Florida is considering a minimum efficiency standard on top of its state energy code and New Jersey, Oregon, and the Northwest Power Regional Planning Council have expressed interest in mandatory minimums.

Room units

Not to be forgotten is the efficiency record for room air conditioners. The Association of Home Appliance Manufacturers (AHAM) reported that the sales-weighted average for all domestic room units shipped in 1983 was 7.29 EER, a 21.9% improvement over the 5.98 EER average for 1972 shipments.

AHAM said that, in 1983, room air conditioners with EER's of 7.5 or more accounted for 50.6% of shipments. Of the total shipment figure, 22.4% had EER's of 8.5 or more. In 1974, only 19.9% of shipments had EER's of 7.5 or more and 10.7% had EER's of 8.5 or more. In that year, 52.3% of shipments had EER's of less than 6.5.

Of little market value, in our opinion, has been the residential conservation service (RCS) home energy audit programs offered by many utilities either free or for a token charge that's about a fifth of the real cost. The rest of the cost is made up by the ratepayer base.

Testimony before Congressional committees revealed that many home energy audits were requested by middle class homeowners looking for confirmation — and a pat on the back — of energy conservation steps they have already taken.

Similarly, the fact sheets mandated by the Federal Trade Commission for furnaces and boilers also have been a flop, according to the General Accounting Office report to Congress. A survey it conducted revealed that 80% of contractors operating in cold climates said they used the fact sheets only occasionally or never.

Housing characteristics

Again this year, The News has been able to obtain from the Bureau of the Census the characteristics of new homes completed during the first nine months of the previous year. The accompanying table on page 107 contains both national figures and, because these figures have an annoying habit of clouding local experience, a regional breakdown as well.

It's important to note that these figures are for reported home unit completions and not for home starts, which are reported elsewhere in this issue. Therefore the increase in 1984 completions, from 641,000 single-family and 330,000 multifamily completions in the first nine months of 1983 to 751,000 single-family and 459,000 multifamily units completed in the first nine months of last year, are not stastistically important.

Looking at fuels for single-family homes, gas increased its share by 1.7% to 45.4%, largely at the expense of electricity, which dropped from 50% to 48.2%. Oil, at 2.2%, and other fuels or none, at 4.1% were close to the previous year's levels. But in the multifamily segment, electricity increased its share from 70% in 1983 to 71.7% last year largely at the expense of gas, which declined from 28.5% to 26.3% in 1984. Oil in 1984 declined marginally from 0.9% to 0.8% last year, and other fuels or none gained from 0.6% in 1983 to 1.2% last year.

Although heating system shares remained fairly constant, there were some small shifts from 1983 to last year: warm air furnaces declined from 56.3% to 55.8%, heat pumps gained from 28.5% to 30%, hydronics increased from 3.7% to 4%, electric baseboard, panel, and radiant systems declined from 6.3% to 5.6%, and other fuels or none declined from 5.2% to 4.6%.

The penetration of central air conditioning in single-family homes completed last year was 71.5%, up from 70% among those completed in a similar period in 1983. Among multifamily units, 89.8% of those completed in the first nine months of last year were air conditioned compared to 89% in the same time period a year earlier.

It should be noted that in the South, where 50.4% of single-family and 57.6% of multifamily completions were located last year, the penetration of air conditioning was 92.3% for single-family and 99.2% for multifamily homes completed in the first nine months of last year. A third of the single-family and two-thirds of the multifamily homes completed in the Northeast last year were air conditioned.

The penetration of heat pumps among single-family homes completed in the South last year was 40.9% and 27.7% in the West. Heat pumps were installed in only 7.3% of the homes completed in the North Central region and 14.1% of those in the Northeast.

Even though U.S. homeowners have indicated clearly they want the availability of comfort cooling, we have suspected for a long time that they are using it quite differently from the early days when mostly affluent homeowners took advantage of low energy costs to run their comfort cooling systems all summer. We believe that most today open their windows during mild weather and use their air conditioning only in very hot or humid weather.

A study conducted by the Energy Information Administration in conjunction with the 1982 Housing Characteristics would appear to confirm that notion.

Of the 48.7 million homes with air conditioning, EIA reported 23.4 million had central systems and 25.3 million had room air conditioners. Of the total, 45.2 million householders paid directly for their own energy costs and 3.4 million did not.

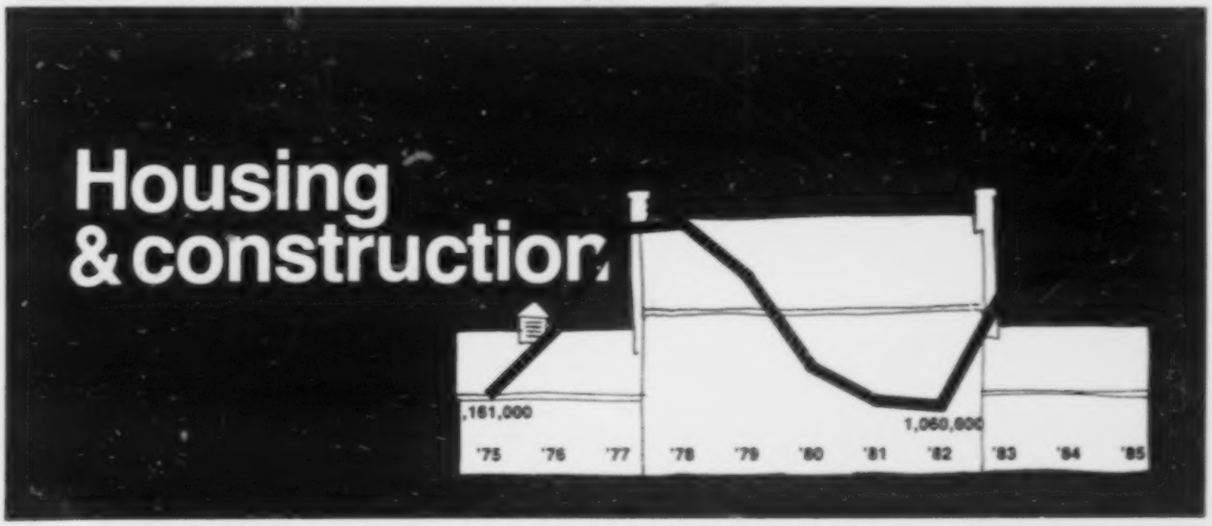
Of those with central air conditioning, 32.6% let it run all summer, 38.9% used it only a few times, 20% used it quite a bit, 4.5% didn't use their air conditioning at all, and 4% didn't live in the home that summer.

Of those who used room units, 11.1% let them run all summer, 60.2% used them only a few times, 13.2% used them quite a bit, 10.4% didn't use them at all, and 5% didn't live in the home that summer.

For all air conditioned homes on a regional basis, 36.4% of those in the South used it all summer. The closest rivals for all-summer use were in the West, at 13.5%. Those who used air conditioning just a few times were: Northeast 67.6%; North Central 59.6%; South 35.6%; and West 53.8%. Those who used it quite a bit ranged from 11.9% to 19.1%.

Although those with a family income of $35,000 or more, at 29%, tended to use their air conditioning all summer more than those with lesser income, regional differences were much greater. Those living in areas with 2,000 cooling degree days or more, for example, were the biggest advocates (47.4% all summer, 16.3% quite a bit) of comfort cooling.

Housing & construction



Even though private new home starts in the last half of 1984 were running 18% behind first-half performance, the year ended with a total of 1,744,700 new home starts, the highest production level since 1979.

Last year's total was only 2.5% ahead of 1983 but it must be remembered that, in 1983, housing starts increased by 60.3% for the fastest indus-

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try turnaround since 1946. In short, the housing industry started nearly 3.5 million new homes in the past two years and, along with autos, served as a flagship of the nation's economic recovery.

We expect that the recovery in the housing market will continue in 1985 at a pace close to that of the past two years. The total for this year should be about 1,650,000 units, or 5.4% below the total for 1984.

Mortgage rates, which peaked at an impossible 17.5% in mid-1982, dropped to as low as 11.5% late that same year. The rates ranged from 13% to 13.5% throughout most of 1983 and, last year, stayed mostly in the 12.25% to 12.75% range. The effective mortgage rate for new homes fell to 12.26% in January, 1985, almost the same as the 12.29% effective rate at the same time a year earlier.

In contrast to four years ago when 95% of all mortgages were at fixed rates for 25 or 30 years, more than half of new home buyers last year accepted some form of adjustable-rate mortgage. These mortgages usually start with interest rates of about 2.25% less that those for fixed-rate mortgages and were introduced when fixed rates went into the stratosphere.

Even though mortgage interest rates of 12% and 13% might have been considered unconscionable only a few years ago, they are considered relatively low today. For this reason, particularly in the first half of the year when fixed-rate mortgages should be available at less than 13%, we can expect a significant shift back to fixed rates.

A major concern of builders as they enter 1975 is the tax reform proposal put forward by the Treasury. It would allow mortgage interest deductions only for principal residences, eliminate property tax deductions, and make other changes that would cripple the second-home market and decimate the multifamily new home and renovation markets.

Another cloud hanging over the housing industry today is the federal deficit, which topped $175 billion in fiscal 1984 and, this year, promises to go even higher. If there is a ray of sunlight, it's that this distortion of the nation's money markets has not interfered with home mortgages more than it has. Other major economic problems, such as the growing trade deficit and the effect of the strong dollar in foreign markets, affect housing only indirectly.

1984 experience

Private housing starts, which recovered dramatically with a 60.3% increase in 1983 to 1,703,100 units, advanced only another 2.5% last year to 1,744,700 units. The total in 1982, in the depths of the recession, was 1.062,200 units, or about half the level as late as 1978.

Single-family housing starts in 1984 totaled 1,079,900 units, up 1.2% from the 1,067,600-unit total for the previous year bût still well below the 1.4 million-unit total for 1978.

Multifamily housing starts totaled 664,800 units last year, up 4.6% from the total of 635,500 units in 1983, but there was a continuing weakness in the townhouse and condominium sectors of this market.

An encouraging note in 1984 was the recovery of the housing markets outside of the sunbelt.

For example, these markets showed major increases last year: Maine up 41%, New Hampshire up 56%, California up 25%, West Virginia up 48%, Michigan up 29%, South Dakota up 25%, Vermont up 42%, Missouri up 35%, New Mexico up 40%, and Utah up 34%.

Declining oil prices are blamed for the fact that some states that have been the stars of past years did not do so well last year. For example, 1984 housing starts in Texas were down 27%, Louisiana down 20%, North Dakota down 30%, and Alaska down 40%.

1985 forecast

A relatively stable mortgage market with ample funding, together with an economy that should grow at a modest rate at least through the rest of 1985, should make for another good year for homebuilding and related construction.

Home construction this year, however, will not be quite as strong as in 1984. There are several reasons. The sunbelt markets, although still vigorous, are not displaying the air of boom times that added something extra to the whole housing market. Too, there is a demonstrated weakness in both the townhouse and condominium markets throughout the country.

In many respects, it would appear that 1985 will be a repeat of last year in that relatively low interest rates will spark a much higher level of activity in the first half of the year than in the last half. There is some reasons to expect interest rates to increase a bit in the third quarter, much as they did last year.

For these reasons, then, we expect total private new home starts to drop 5.4% this year to a still-respectable 1,650,000 units. The forecast is in line with the revised outlook of the National Association of Home Builders (NAHB) and with a forecast we made a year ago that the 1983 level of homebuilding would be sustainable for at least two more years.

We expect single-family home starts will decrease by about 12% to 950,000 units for the reasons already discussed together with the fact that single-family home construction also is more sensitive to minor fluctuations in mortgage interest rates.

Multifamily starts, on the other hand, should increase in 1985 by 5.3% to 700,000 units. Not only is the demand for rental units growing in the South, but improved economic conditions have resulted in a fast-growing demand for rental units in Northeast and Midwest urban markets that have been all but dormant for several years.

A survey conducted by NAHB's Builders Economic Council at the end of 1984 showed an improvement in sales, sales expectations, and in subdivision traffic. The best-selling new homes, those under $50,000, appeal to the largest customer group, the first-time buyers.

The second best selling category, homes costing $50,000 to $75,000, also appeals largely to first-time buyers. Most of this group consists of married couples with an average age of 33 years, typically both working. The average age of first-time home buyers has not changed since World War II, which NAHB says disproves the theory that the big market today is an upgrade market dominated by older homeowners.

As in the past, this year's housing market experience will be uneven geographically and in terms of mix. The big winner is the West, where permit activity is up 23% and multifamily activity is up 54%. The strongest of these markets is California, where economic growth is the strongest in the nation, followed closely by Arizona, where the unemployment rate has fallen from 9% to 4.5% in a year.

The Northeast also will do well in 1985, although 70% of the improvement will come in the states of New

York, Massachusetts, New Jersey, and Connecticut. A third of the region's multifamily construction is located in New York State, where apartments represent 41% of the state's housing market. Multifamily construction in the region, however, is expected to grow only 2% this year.

In the North Central states, single-family home construction is expected to grow 6% this year. But multifamily construction, thanks to an improving economy and little activity for four years, is indicating a 35% increase or one and a half times the national average.

The leading states in the multifamily market are South Dakota, Missouri, Indiana, and Kansas. In the single-family home market, the leaders are Illinois, South Dakota, Michigan, and Indiana. The unemployment rate in Michigan is down to 10.3% after being more than 15% two years ago.

In the South, which practically carried the rest of the housing industry on its back during the recession years, single-family home construction is expected to drop 3% and multifamily construction will be down 5% this year. Particularly badly hit are the Texas markets, with a drop of 44,000 housing units, followed by the other energy market-dependent states of Oklahoma and Louisiana.

It must be remembered that, although the declines in the South are not that steep, this region represents more than half of the nation's new home construction market.

Local markets

New home construction activity in the top 20 local markets in 1985, which showed a 1% increase last year to 589,458 units, is expected to decline by 8% to a new total of 542,449 units. That's about a third of the total new home construction throughout the country.

Although a decline of 19% to 66,900 units is projected for the Dallas-Fort Worth area of Texas, it remains the top market in the nation. In 1984, this market accounted for 82,900 units, down 26% from the year-earlier total of 112,500 units.

Pent-up demand from the recession has largely been satisfied in Atlanta but, despite an expected 14% decline from last year to 44,075 units, it becomes the nation's second largest market this year. The total for 1984 was 51,300 units, the highest in Atlanta's history.

The 1984 records of the other leaders, with the 1985 projections in brackets, follow: Phoenix 60,000 (42,500); Riverside-San Bernadino, Calif., 34,000 (36,000); Houston 30,880 (32,320); Los Angeles-Long Beach 33,000 (32,000); Tampa-St. Petersburg, Fla. 30,237 (27,111); Washington, D.C. 33,104 (27,100); West Palm Beach-Boca Raton, Fla. 23,074 (25,750); San Diego, Calif. 23,157 (23,600); Miami 16,815 (21,900); Orlando, Fla. 23,960 (20,900); Denver-Boulder, Colo. 24,182 (20,843); Chicago 21,030 (19,000); Fort Lauderdale, Fla. 15,494 (18,075); Anaheim-Santa Ana, Calif. 17,000 (18,000); Minneapolis-St. Paul, Minn. 18,400 (17,500); Phila-

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delphia 16,000 (17,400); San Antonio, Texas 19,330 (16,200); and Baltimore, Md. 15,590 (15,275).

It's interesting to note that, when NAHB began monitoring housing production in metropolitan areas in 1963, the top cities were New York, Chicago, Washington, and Los Angeles-Long Beach.

Tax reform

Even though it's unlikely that Congress will resolve the issue of tax reform this year, there is a deep concern in the housing industry that the tax reform plans brought forward to date would destroy the multifamily home market and impact single-family home ownership more than most realize.

Three reform proposals have attracted national attention: the Treasury Department; the proposal of Senator Bill Bradley (D-N.J.) and Rep. Richard A. Gephardt (D-Mo.); and the proposal of Rep. Jack F. Kemp (R-N.Y.) and Senator Bob Kasten (R-Wis.). Each employs a modified flat rate (15%, 25% and 35% for Treasury, 14%, 26%, and 30% for Bradley-Gephardt, and 20% and 25% for Kemp-Kasten). All would reduce the corporate tax rate — 33% under Treasury and 30% for the other two proposals.

All three would retain the deduction of home mortgage interest, but only for principal residences. NAHB says this would negatively impact the sale of about 75,000 new second homes a year and the resale of about 200,000 others. The reduction in the number of tax brackets would not materially affect new home buyers, who need about $40,000 annual income to qualify today, the association said. The two Congressional plans would keep the deduction for local property taxes but the Treasury proposal would eliminate it, a move that would cost most of the nation's 55 million homeowners an extra $30 per month.

All of the proposals would repeal the bad debt allowance for banks and thrift institutions, the tax exemption for mortgage revenue bonds and industrial development bonds (including rental housing), and the Treasury proposal would repeal installment sales treatment for so-called builder bonds.

NAHB said the removal of tax-exempt revenue bonds would adversely affect about 100,000 for-sale homes and another 100,000 rental units. Removing the investment tax credit would make the renovation of most rental units infeasible, removal of the accelerated cost recovery system would make it very difficult to build any rental units, and the removal of installment sales treatment for builder bonds would add $50 to $70 to the monthly costs of a new-home buyer.

"Few, if any, multifamily rental units built in recent years would have been constructed were it not for the fact that investors were able to reduce or defer taxes on other income as a result of tax losses associated with the initial period of ownership of rental real estate," NAHB said. "Because of the highly competitive nature of the real estate market, these benefits translate into rents which are significantly below the levels which would have been necessary to compensate investors in the absence of the tax incentives."

Builders said that, under the Treasury plan, apartment rents would have to be raised 35% to give investors the same rate of return as today. Under the Bradley-Gephardt plan rents would have to be raised by 23% and, under the Kemp-Kasten plan, they would have to be raised by 18%.

In the preface to a nine-month study entitled "Housing America — the Challenges Ahead," NAHB said: "Home ownership is part of the bedrock of the democratic society and capitalistic economy of this country. [It] strengthens the family, the community, and the nation, giving individual Americans a stake in the local community and stimulating political involvement."

Today's housing stock is valued at $2.7 trillion, or 27% of the nation's total wealth, according to the study. Housing led the economic expansion of 1983-84, just as it had following the seven preceding postwar recessions "yet the process of housing America now is at a critical and historic crossroads."

Shifting government priorities and policies, changes in household composition and housing demands, proposed tax reform, runaway federal deficits, financial deregulation, and industry innovation and technical advances have combined to generate sweeping and fundamental changes for builders and housing consumers.

The reasons for the new conditions begin with demographics. As members of the baby boom generation — those born between 1946 and 1964 — reach middle age, they will generate a steady demand for the traditional single-family house. There will also be a substantial increase in the elderly population. And the migration from the Northeast and the Midwest is likely to continue, although housing demand will vary widely within geographic areas. Affordability will constrain some, particularly the young and those with low incomes.

The U.S. population will grow more slowly in the 1980's and 1990's than it did in the 1950's through 1970's. The Census Bureau projects that population will grow only 9.6% in the 1980's (from 228 million to 250 million) and by 7.3% in the 1990's (to 268 million by the year 2000). Because of this slower population growth, household formations will slow from 16.8 million in the 1970's to 14.1 million in the 1980's and 12 million to 13 million in the 1990's.

Growth of the population in the prime household-forming ages of 18 to 24 years will peak in the mid-1980's and decline by 15% for the decade as a whole. The growth of the population, aged 25 to 34 will begin to fall off sharply by the late 1980's even as those aged 35 to 44 will increase by 46.2%.

Although single-person households will continue to increase through the year 2000, married baby boomers and a stabilizing divorce rate should leave married-couple households with a 54% share of all households in the 1990's, NAHB speculates. "Baby boom women will marry later in life and have fewer children than their mothers, but the vast majority will marry and have children."

Currently about 80%, or 60 million, baby boomers have formed their own households and 30 million are homeowners. Because the spending power of this age group is significantly higher than for the entire population, and because a disproportionately high number have two incomes, they will create a strong demand for trade-up homes throughout the 1980's and 1990's.

Too, strong growth in the over-65 population through 1995 will increase the demand for alternative housing, including shared housing. An increase in the over-85 population from 2.2 million in 1980 to 4.9 million by the end of the century will increase the demand for health care services, including hospitals and nursing homes.

Although the growth of nonmetropolitan areas slowed during the early

1980's because of the recession and the decline of industries based there, the shift in population to nonmetropolitan areas is expected to continue.

Housing demand will continue to be hottest in the sunbelt for the rest of the century. More than half of the nation's 40 million population growth will be concentrated in California, Florida, and Texas. Arizona will gain about 2.9 million and the eight mountain states are expected to increase by 9.7 million.

Meanwhile, growth in the Midwest will slow to 2% in the 1980's and turn negative during the 1990's. The Northeast will lose 1.7% of its population in the 1980's and 4% in the 1990's.

Affordability is a growing problem. The number of renter households with real incomes below $5,000 (measured in 1980 constant dollars) nearly doubled from 1974 to 1981. In 1981, more than 71% of low-income renters were paying more than 35% of their income for rent, 11.6 million Americans lived in substandard housing, and 16.5 million lived in rundown neighborhoods.

NAHB estimates that household formations should average 1.5 million annually for the rest of this decade and then fall to between 1.2 million and 1.3 million in the 1990's. The average for the 1970's was nearly 1.7 million. Housing losses should remain low, partly because of the high cost of new construction and partly because 60% of the current inventory was built after 1950 and is in good condition.

Housing starts from 1984 through 1989 will range from 1.5 million to 1.8 million because of the recession-caused low production in the first three years of the decade. Starts will drop to between 1.4 million and 1.5 million units in the 1990's. Mobile home shipments are expected to decline from an average of 290,000 in the 1980's to an average of 250,000 annually in the 1990's.

The association believes that conversion, rehabilitation, and a wide range of adaptive reuses — including the renovation of single-family homes into two-or-more-family dwelling units, the conversion of factories, warehouses, and other nonresidential structures into residential units, and the rehabilitation of vacant or abandoned structures — will add 3.4 million units to the housing stock in the 1980's and 3 million units in the 1990's. In addition, another 250,000 new or rehabilitated housing units are needed annually for the next 15 years to upgrade the nation's substandard housing stock.

Deregulation, innovations in financial markets, and technological advances in the mortgage delivery system have brought rapid change to the nation's housing finance system. Although the cost of credit still is too high for many potential home buyers, there is no doubt that today's system is more flexible and resilient.

Recent legal and regulatory actions have had mixed effects on the housing finance system but mortgage availability problems are largely a phenomenon of the past. The elimination of ceilings on home mortgage interest rates and the dismantling of deposit rate ceilings have allowed thrift institutions to compete for funds, but not before they got locked into large portfolios of below-market fixed-rate mortgages.

Broader asset powers, including the authority to acquire adjustable-rate mortgages, have enabled savings and loan associations and mutual savings banks to shorten the maturity structure of their assets. Consumer and commercial loans, although now allowed, have not been emphasized.

Development of the private mortgage security markets has meant savings in the cost of issuing private pass-through securities and in the prices at which they can be sold. Securities of the Federal National Mortgage Association (FNMA) and the Federal Home Loan Mortgage Corporation (FHLMC) have an advantage over private mortgage securities because of their federal backing. However, many of the barriers to the private market were removed by recent regulatory changes and by passage of the Secondary Mortgage Market Enhancement Act of 1984.

The upshot of these developments has been that the thrift industry has regained much of the mortgage market share (about half) it enjoyed prior to the 1979-1982 crisis when thrifts were caught in an interest rate crunch.

NAHB feels thrift institutions will retain their focus on home loans. They now have the tools to absorb, reduce, or shift portfolio interest rate risk while concentrating their assets in mortgage instruments. However, it should be noted that the Treasury tax reform proposal would remove the bad-debt reserve tax protection provisions.

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Some within the Reagan Administration favor private mortgage securities markets to the exclusion of the secondary market programs of federal agencies and of federally sponsored enterprises, but NAHB says most builders, sellers, and primary market financiers generally favor the improvement of all types of secondary market channels. The Secondary Mortgage Market Enhancement Act of 1984 was designed to enhance the development of the private mortgage securities market.

Housing finance agencies (HFA's), which have been created in every state except Kansas since they were first established by New York in 1960, now are a major source of affordable credit for both homeowner and rental housing.

The HFA's major role has been to raise funds in tax-exempt bond markets and to provide these funds for both single-family and multifamily housing at interest rates 2% to 3% below the private capital markets. In 1984, the total amount of these bonds was $17.6 billion, of which $11.4 billion was used for single-family homes, $4 billion was used for multifamily homes, and $2.2 billion was used for veterans' housing.

Through the first nine months of 1984, 67% of all new single-family homes were sold using conventional financing; 14% used FHA; 8% used VA; 9% paid cash; and 2% used Farmers Home Administration financing. It might be noted that 30% of the homes sold in 1982 and 23% of those sold in 1983 were FHA-insured.

For the first time since the 1930's, the nation's rate of home ownership has turned significantly downward, according to the Census Bureau. After climbing from 43.6% in 1940, 55% in 1950, 61.9% in 1960, and 65.8% in 1980, home ownership has declined to 64.4% at the start of 1984. Had home ownership remained at its peak, there would be 850,000 more homeowners in 1985.

The mortgage delinquency rate in the third quarter of 1984 was 5.68%. The rate at the same time a year ago was 5.34%, according to the Mortgage

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Housing and construction

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Bankers Association.

Prices

Existing home sales in November, 1984, were at an annual rate of 2.89 million units, 7% above the rate of a year earlier but 29% lower than the peak rate of 4.06 million units set in November, 1978. Existing home sales in 1983 totaled 2.72 million, up 36.6% from the 1.99 million existing homes sold in 1982.

According to the National Association of Realtors, the median price of homes sold in November, 1984, was $72,500, up 3% from a year earlier. Prices were highest in the West ($95,100) and lowest in the Midwest ($55,600). The median price was $83,700 in the Northeast and $70,600 in the South.

In November, 1984, the median price of new single-family homes sold was $81,700, up $5,800 from the $75,900 median price of a year earlier. That represented a 7% increase, reversing a relatively flat trend during the recession.

In terms of affordability, NAHB structured the case of a typical $80,000 home with a 10% down payment and a 30-year mortgage of $72,000.

At a mortgage interest rate of 13%, the monthly principal and interest payment would be $799. To this should be added $95 for property taxes and insurance, for a total of $894 monthly. The required income to qualify for the mortgage is $38,299, which can be met by 23.4% or 14.4 million families.

But if the mortgage interest rate were 11%, the principal-interest payment would be $686 monthly, property taxes and insurance would be $95, and the total would be $781 monthly, or $113 monthly less. More importantly, the annual income needed to qualify would be $33,458 and 29.9% or 18.4 million families could meet it. The 2-point spread in interest rates expanded the market by 4 million families.

The median size of a new single-family home built in 1983 increased by 45 sq ft to 1,565 sq ft when compared to a median home built the previous year. The median size of a new home built in 1978 was 1,645 sq ft and, in 1982, it was 1,520 sq ft. The median size of a multifamily unit, at 893 sq ft in 1983, was down from 925 sq ft a year earlier, according to data compiled by the Bureau of the Census and the U.S. Department of Housing and Urban Development.

Of the new single-family homes built in 1983, 70% were equipped with central air conditioning, 72% had two or more bathrooms, 57% had one or more fireplaces, only 32% had full or partial basements, 75% had a garage or carport, 49% used electricity for heating, and 18% had four or more bedrooms.

The typical 1984 home buyer, according to NAHB, was 34 years old, married, earned $39,986, and lived 26 minutes from work. He put 9% down on a $77,600 home.

Traditional households (husband, wife, children) accounted for 56% of the sales. Single parents or groups of unrelated individuals accounted for 14.2%. Of the total, 58% of households had two incomes. The median household income for first-time buyers was $34,755 and, for repeat buyers, it was $43,590. The median income for first-time condominium buyers was $19,316 and, for repeat buyers, it was $34,667.

Fixed-rate mortgages accounted for 56% of single-family home sales and 48% of condominium sales. Of the total, 55% of the condominium buyers and 41% of the single-family buyers were purchasing their first home. And 71% of all buyers ranked energy efficiency as "a very important consideration" when deciding which home to purchase.

Multifamily

In 1980, the Bureau of the Census reported there were 28.5 million rental units in the U.S. Of these, about 60% were in structures with fewer than five units and only 16.5% were in buildings with 20 or more units. Eight of nine rental units have no direct government subsidies but one of every three poor households lives in a subsidized rental unit.

Renters typically have lower incomes than homeowners and, in recent years, that gap has widened. The median income of renters was 65% that of homeowners in 1970 and, by 1981, the income of renters was only 52% that of homeowners.

Also in 1980, more than a third of all renter households consisted of just one person and almost two-thirds consisted of no more than two persons. In contrast, less than one-sixth of homeowner households consisted of one person and about half were made up of no more than two persons.

There is a mounting affordability problem among renter households. In addition to cutbacks in federal programs subsidizing the rental payments of low- and moderate-income households, tax reform proposals would curtail critical tax provisions encouraging rental housing construction.

The NAHB estimates that, of the 636,200 multifamily starts in 1983, a total of 324,300 were nonsubsidized rental units, or 51%. The others were: 37,000 Section 8 (subsidized) units; 160,000 condominiums; and 114,900 garden apartments (2 to 4 units).

In 1984, NAHB estimated that the number of nonsubsidized rental units built totaled 349,000, or 56%, and the number of Section 8 units declined to 4,000 units.

The national vacancy rate in September, 1984, was 6% for rental apartments, up from 5.6% a year earlier.

Mobile Homes

Shipments of mobile or manufactured homes in 1984 totaled 295,013 units, an almost identical number to the 295,203 units shipped in 1983, according to the Manufactured Housing Institute (MHI).

Shipments of these site-delivered homes, popular with retired people and those with moderate incomes, continued strong through the recession. Although not counted in the official housing statistics, shipments of these homes amounted to 27.3% of the private single-family site-built homes started in 1984. This compares to 27.7% in 1983 and 36% in the previous year.

The manufactured home market was considerably strengthened in 1983 when regulations under Section 203 (b) of Title II of the National Housing Act were changed to allow 30-year FHA-insured loans with limits ranging from $67,500 to $90,000. FHA will insure 97% of the first $25,000 and 95% of the remainder.

MHI reports its major project today is to remove zoning barriers that prevent the placement of manufactured homes in many residential neighborhoods.

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Labor

Rather than union power, labor rates in the organized segment of the construction industry now are most often being established in keeping with the competition and with the volume of work available in each area, according to the Construction Labor Research Council (CLRC).

As a result of these competitive market forces, CLRC reported there has been a high degree of labor rate moderation and stability that is likely to continue.

Heavy bargaining in 1985 will again be a consequence of the large number of one-year agreements, once construction industry oddities, that were negotiated last year. One-year contracts have become the norm as labor and management use contract flexibility as a tool to more quickly react to market changes. This flexibility applies to contract terms and conditions as well as wages and fringes.

"As bargainers react to specific situations in their negotiations, a wider variation in the level of new settlements may become apparent," CLRC reported. "A continuation of freezes and rollbacks can be expected in those areas where union construction still is attempting to become cost-competitive, but increases will occur where they reflect local conditions."

It's likely that, while overall labor rate increases will remain moderate, there will be sizeable exceptions — both higher and lower.

The average increase in wage and fringe rates for construction workers during the past five years was $5.82, bringing the average hourly rate in the U.S. to $19.94. This represents an increase of 40.6%. As usual, there was little variation among crafts.

The 2.2% construction union wage increase in 1984 was the smallest since World War II. As recently as 1981, when increased levels peaked, the annual increase was 10.5%. CLRC added, however, that even though the 1984 increase was less than the rise of the consumer price index (CPI), the CPI increased by only 37.2% over the past five years, or less than construction union wages.

Reduced rates of increase have occurred in all regions of the country. Increases in New England far exceed those of any other region in both the past year and over the past five years. In the South Central and Mountain-Northern Plains regions, the areas with the smallest five-year increases, wage-plus-fringe rates decreased in the past year rather than increased.

Close to 70% of all of the construction industry's collective bargaining agreements are scheduled to be renegotiated in 1985. As more multi-employer bargaining units disband and contracts expire without being renegotiated, CLRC said a greater amount of uncertainty

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is associated with measuring the amount of negotiating activity. In some cases, it said old contracts remain in effect indefinitely following their expiration dates.

"Fewer large cities will be negotiating in 1985 so that the number of workers covered by expiring contracts will drop to about 750,000," CLRC reported. "Even in those regions with the fewest negotiations, almost half of all contracts will expire in 1985."

The heavy bargaining schedule means fewer scheduled wage and fringe increases already identified for the years ahead. For the 558 contracts already settled through 1985, the average increase this year is 90 cents/hour or 4.3%. Scheduled 1986 increases average 85 cents/hour or 3.9%.

But CLRC warned: "Scheduled increases for 1985 may be less of an indicator of this year's bargaining than in past years because fewer contracts have known scheduled increases, and those that do are clustered in certain areas. Three states — California, Illinois, and New York — account for more than 40% of the workers with 1985 deferrals."

The industry's principal open shop group, the Associated Builders and Contractors (ABC), expects that open shops will enjoy increased demands but that it will be a mixed year for construction.

It cited a Wharton School of Business Industrial Research Unit study that estimated approximately 70% of all construction nationally now is handled by open-shop contractors.

ABC president-elect William Gentry expects the greatest growth in 1985 will come in the manufacturing, institutional, and public works sectors. A decline in the commercial office building market, he said, will offset much of the increase.

The strongest growth can be expected in the Northeast and in the Midwest, he said. The sunbelt states, which traditionally have been the busiest in recent years, will experience a decrease in construction demand.

Crafts

The average wages-plus-fringes for United Association pipefitters in the U.S. on Jan. 1, 1980, was $15.93/hour. By Jan. 1, 1985, that average rate had increased by $6.59/hour, or 41.4%, to $22.52/hour, according to CLRC figures.

The lowest increases were those granted in the Southeast ($4.62 to $18.03/hour) and South Central ($4.88 to $18.73/hour) regions. The highest increase ($9.27 to $28.39/hour) went to the Southwest Pacific region.

UA plumber locals averaged $16.01/hour on Jan. 1, 1980, and on Jan. 1, 1985, the wages-plus-fringes package had increased by $6.99/hour, or 43.7%, to $23.01/hour. The lowest increase was $3.77/hour (to $18.18/hour) in the South Central region and the highest was $8.72/hour (to $25.46/hour) negotiated in the Middle Atlantic region.

Members of the Sheet Metal Workers' International Association averaged $15.49/hour on Jan. 1, 1980. By Jan. 1, 1985, that wage-fringe package has increased by $6.98/hour, or 45%, to $22.48/hour.

The lowest increases for sheet metal workers were the $4/hour (to $18.28/hour) in the Mountain-Northern Plains region and the $4.93/hour (to $18.21/hour) negotiated in the Southeast. The biggest increase was the $9.44/hour (to $23.95/hour) negotiated in the New England region.

International

Despite a hard U.S. dollar that makes exports more expensive abroad and imports cheaper at home, the U.S. refrigeration and air conditioning industry in 1984 maintained a positive trade balance of $962.6 million — quite a feat when it's considered that imports swelled to $640.5 million last year, including a 90.3% increase in imported compressors.

The total value of exports, according to the Department of Commerce, was $1,603,079,407 in 1984, or 2.36% more than the $1.566 billion total for the previous year. But at the same time, the $640,481,168 value of refrigeration and air conditioning equipment imported into the U.S. last year was 61.4% more than the $396.8 million worth imported into the U.S. in 1983. The total for 1982 was $289.6 million.

Even though imports represented only 40% of exports in 1984, the gap is closing rapidly. Imports represented 25.3% of exports a year earlier — and only 13.2% of exports in 1981. The biggest shift has been caused by the exponential increase in imported compressors, the value of which has grown from $98 million in 1980 to $369.6 million last year.

The positive balance of trade generated by air conditioning and refrigeration equipment amounted to $962,598,239 in 1984, down 21.4% from the $1.169 billion positive trade balance in 1983. The trade balance in favor of the U.S. in 1981 was $1.8 billion.

These figures, however, only represent shipments. They do not take into account the profits to U.S. companies from subsidiaries, joint ventures, and licensing agreements that are not reinvested abroad.

Just as we observed a year ago, there is nothing on the horizon to suggest that the trend established in 1982 — increased imports, particularly compressors, and declining exports — will not continue in 1985.

The U.S. economy continues to be stronger than those of most industrialized nations, relatively high interest rates and stability continue to attract investments from abroad, and the minimal weakening of U.S. currency versus the currencies of its major trading partners does not promise to materially change the price disadvantage faced by U.S. exports.

In the near term, at least, we can look forward only to a continued whittling away of the U.S. positive trade balance.

Major export markets

U.S. air conditioning, refrigeration equipment (values in millions)

Market	— 1980 —		— 1981 —		— 1982 —		— 1983 —		— 1984 —	
	Value	% of total	Value	% of total	Value	% of total	Value	% of total	Value	% of total
Canada	310	17	401	19	352	19	422	27	530	33
Central, South America	262	14	363	18	285	16	180	12	211	13
Western Europe	320	16	315	15	323	18	277	18	290	18
Far East	289	16	314	15	297	16	242	15	247	15
Middle East	457	25	506	24	445	25	361	23	266	17
Africa	117	6	164	8	98	5	51	3	48	3
Other	108	6	10	1	1	1	33	2	11	1
Total	**1,863**	**100**	**2,073**	**100**	**1,802**	**100**	**1,566**	**100**	**1,603**	**100**

In 1984, for the second year in a row, Canada was the export market for U.S. refrigeration and air conditioning equipment. The $530 million in exports to Canada, or 33% of the total, represented an increase of $108 million, or 25.6%,over the $422 million total for 1983.

The Middle East, which had been the leading U.S. export market for many years, gave way to Canada in 1983 and, last year, was topped by Western Europe. The Middle East share dropped to 17% when exports to that region also dropped by $95 million, or 26.3%, to $266 million last year. Exports to Western Europe increased by only 4.17%, or $13 million, last year to a total of $290 million but it was enough to hold Europe's share at 18% and gain second place.

The Central and South American market, and the Far East market, grew a bit and the African market shrank a bit but their shares of the U.S. export total remained about the same.

As an aside, the Air-Conditioning and Refrigeration Institute (ARI) reports it is working with the Bureau of the Census to reclassify U.S. refrigeration and air conditioning export categories to bring them more in line with the way domestic products are classified and with the international Harmonized System (HS) that will become the standard in 1987.

At present, import data are collected under the Tariff Schedule of the U.S. Annotated (TSUSA) and exports are classified under Schedule B of the Bureau of the Census. The new classification system is expected to ing the data more in line with Standard Industrial Code (SIC) 3585, Air Conditioning and Refrigeration Equipment, Including Warm Air Furnaces.

It might also be noted that, in December, 1984, the U.S. International Trade Commission released a 61-page summary of trade and tariff information on refrigeration and air conditioning machines and related products that provides information on competition between domestic and foreign products.

A new round of world tariff negotiations could be initiated in 1985, according to President Reagan. In the meantime, Canada and the U.S. are discussing the possibility of a free trade agreement similar to that used by the auto industry for many years.

Imports

According to the Department of Commerce, eight nations accounted for $613.6 million of the $640.5 million worth of refrigeration and air conditioning equipment imported into the U.S. last year. The eight:

- $336.7 million from Japan, up 76.3% from $191 million in 1983, which mostly included 2.2 million automotive air conditioning compressors, 1.8 million compressors of 0.25 hp or less, 884,600 compressors of from 0.25 hp to 1 hp, 89,500 room air conditioners, 7,400 absorption-type refrigerators, and $71.7 million in auto air conditioning parts.
- $69.9 million from Italy, up 84.4% from $37.9 million in 1983, which mostly included 1.44 million compressors of 0.25 hp or less, 146,600 compressors of 0.25 hp to 1 hp, 261,700 compressors of 1 hp to 3 hp, and 51,200 freezers.
- $69.2 million from Canada, up 24.7% from $55.5 million in 1983, which mostly included 391,100 compressors of 0.25 hp or less, 36,000 unitary air conditioners, 23,400 freezers, 3,830 refrigerators, and 1,000 compressors of 1 hp to 3 hp.
- $40.9 million from Singapore, up 22.5% from $33.4 million in 1983, which mostly included 920,500 compressors of 0.25 hp or less, and 360,200 compressors of from 0.25 hp to 1 hp.
- $39.9 million from Sweden, up 59.6% from $25 million in 1983, which mostly included 94,000 absorption-type refrigerators.
- $23 million from Brazil, which mostly included 746,700 compressors of 0.25 hp or less, 7,000 room air conditioners, and 1,500 absorption-type refrigerators.
- $14.7 million from West Germany, which mostly included 185,400 compressors of 0.25 hp or less, 53,100 compressors of from 0.25 hp to 1 hp, and 3,500 compressors of other sizes.

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- $19.2 million from Mexico, which mostly included 2,700 freezers, $9.2 million in auto air conditioning parts, and $8.8 million in other refrigeration and air conditioning parts.

In all, the U.S. imported $369.6 million worth of compressors last year, up 90.3% from the $194.2 million worth a year previously and 170.8% more than the $136.5 million total for 1982. Of those imported last year, $179.1 million represented compressors of 0.25 hp or less, $104.6 million represented the value of automotive air conditioning compressors, and $85.9 million represented the other compressors.

Looked at another way, Japan led the compressor parade last year with 4.9 million exported to the U.S. followed by Italy with 1.86 million and a Japanese subsidiary in Singapore with 1.28 million. Most of the rest came from Canada (887,700), Brazil (757,800), and West Germany (243,000).

Top markets

In terms of products exported from the U.S., the Department of Commerce's Bureau of the Census prepares country-by-country breakdowns for most of the product categories listed in the 10-year look at industry shipments found elsewhere in this issue. In most instances, it lists the number of units shipped and their total dollar value.

The U.S. was for many years a leading exporter of room air conditioners and, traditionally, sent about 25% of production to foreign markets. It lost that leadership to Japan in 1981 and, last year, exported only 126,648 room air conditioners, or 4% of U.S. production. In 1983, the 227,200 room units exported represented 11.4% of U.S. production. A year earlier, U.S. firms exported 480,100 room units.

Although we do not have the space to reprint the complete breakdowns, a feel for the top export markets of 1984 can be gained by looking at the top customer countries for key products expressed in numbers of units. Here are a few:

- **Auto and truck refrigeration and air conditioning compressors** (282,591 units, down 55.6% from 636,700 units in 1983): W. Germany 140,361; Canada 84,631; Mexico 18,169; Brazil 9,121; and Australia 4,309.
- **Compressors of 3 hp and less** (633,616 units, down 8.4% from 692,000 in 1983): Canada 178,164; Saudi Arabia 97,014; Argentina 90,212; Mexico 61,700; Japan 40,100; Thailand 46,500; and Korea, 11,000; and Japan 40,100.
- **Compressors of from 3 hp to 10 hp** (177,500, up 5.3% from 168,550 in 1983): Canada 97,500; Venezuela 17,600; Mexico 11,000; Thailand 8,300; Australia 7,200; and France 3,500.
- **Compressors of more than 10 hp** (45,449, up 56.7% from 29,000 in 1983): Venezuela 9,300; Saudi Arabia 5,200; Mexico 3,500; France, 3,300; Israel 3,200; Canada 3,100; and Kuwait 2,200.
- **Ammonia compressors** (3,366, up 93.4% from 1,740 in 1983): Canada

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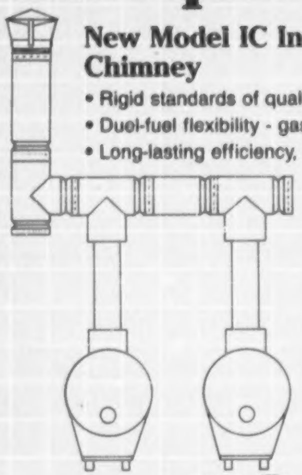

2,400; Mexico 300; S. Korea 200; and Britain 100.

- **Parts for refrigeration and air conditioning compressors** ($32.68 million — no prior year number): Venezuela $5.2 million; Canada $5 million; Belgium $3.4 million; France $2.2 million; Brazil $1.8 million; Mexico $1.6 million; and Australia $1.6 million.
- **Room air conditioners under 10,000 Btuh** (31,224, down 33.3% from 46,800 in 1983): Taiwan 2,900; Saudi Arabia 2,000; Hong Kong 2,500; Kuwait 1,300; and Denmark 600.
- **Room air conditioners 10,000 Btuh to 17,000 Btuh** (48,500, down 31.4% from 70,700 in 1983): Saudi Arabia 9,500; Hong Kong 11,900; Oman 1,800; Canada 1,300; Trinidad 1,300; Pakistan 1,300; Kuwait 1,200; Arab Emirates 1,100; and Portugal 900.
- **Room air conditioners over 10,000 Btuh** (46,920, down 57.2% from 109,700 in 1983): Arab Emirates 9,300; Hong Kong 6,700; Saudi Arabia 5,400; Canada 3,100; Kuwait 2,000; Mexico 1,600; South Africa 1,200; and Taiwan 1,000.
- **Self-contained heat pumps 5 tons and under** (13,730, up 2.5% from 13,400 in 1983): Canada 5,800; West Germany 900; Egypt 900; Arab Emirates 900; Mexico 900; Australia 660; and Britain 500.
- **Self-contained heat pumps over 5 tons** (1,590, even with 1,600 in 1983): Canada 924; Colombia 173; Australia 173; Saudi Arabia 156; and Britain 102.
- **Split-system heat pumps** (20,900, up 16% from 18,000 in 1983): Canada 13,900; Australia 942; Britain 900; Saudi Arabia 800; France 446; and Sweden 400.
- **All-year heating-cooling packages under 5 tons** (28,568 — no previous figures): Canada 23,000; Mexico 1,400; Kuwait 700; Saudi Arabia 600; and S. Korea 500.
- **All-year heating-cooling packages over 5 tons** (2,800 — no previous figures): Canada 1,500; Saudi Arabia 600; and Britain 300.
- **Self-contained air conditioners 5 tons and under** (27,250, up 8.1% from 25,200 in 1983): Canada 8,300; Venezuela 900; Mexico 800; and Colombia 750.
- **Self-contained air conditioners over 5 tons** (14,600, down 16.6% from 17,500 in 1983): Saudi Arabia 4,000; Canada 3,600; Ireland 900; Australia 700; and Denmark 350.
- **Air conditioning condensing units under 5 tons** (76,800, up 26.7% from 60,600 in 1983): Canada 26,000; Saudi Arabia 21,000; Venezuela 3,700; Colombia 3,800; Kuwait 2,600; Arab Emirates 1,800; and Britain 1,200.
- **Air conditioning condensing units over 5 tons** (7,750, up 8.4% from 7,150 in 1983): Saudi Arabia 1,500; Arab Emirates 1,400; Canada 900; Kuwait 500; Israel 500; and Equador 450.
- **Room fancoil units** (30,750, down 7.9% from 33,400 in 1983): Saudi Arabia 7,700; Canada 7,300; Arab Emirates 2,500; Iraq 1,800; Kuwait 1,400; and Egypt 1,300.
- **Variable air volume terminal units** (12,200 — no previous figures): Canada 4,100; Kuwait 2,500; Australia 900; and Taiwan 600.
- **Central station air handlers** (10,400, down 20% from 13,000 in 1983): Saudi Arabia 2,600; Iraq 1,300; Taiwan 800; South Africa 700; Kuwait 700; Turkey 700; and Egypt 500.
- **Centrifugal liquid chillers** (870, down 14.4% from 132 in 1983): Iran 50; 138; Taiwan 98; Hong Kong 90; Saudi Arabia 82; Singapore 68; Malaysia 62; Jamaica 28; and Japan 24.
- **Absorption liquid chillers** (113, down 14.4% from 132 in 1983): Iran 50; Saudi Arabia 24; Canada 18; and Italy 14.
- **Reciprocating liquid chilling packages** (1,700, down 6.6% from 1,820 in 1983): Destination data not available.
- Of the $241.3 million worth of **air conditioning and refrigeration parts,** down 4.8% from $253.5 million in 1983, Saudi Arabia accounted for $60.2 million; Canada $25.4 million; Mexico $9 million; Colombia $7.4 million; Australia $6 million; Arab Emirates $7.3 million; Britain $6.6 million; W. Germany $5.9 million; France $15.5 million; and Kuwait $5.8 million.
- **Ice-making machines** (15,500, down 29.5% from 22,000 in 1983): Canada 6,800; Panama 700; Britain 700; Hong Kong 600; France 500; Australia 500; and New Zealand 500.
- **Drinking water coolers** (no total available in 1984; 64,600 in 1983): Canada 29,000; Saudi Arabia 18,500; Italy 1,600; Britain 1,300; and Kuwait 1,200.
- **Refrigerated self-contained enclosures** (20,000, down 37.5% from 32,000 in 1983): Canada 5,100; Saudi Arabia 2,300; Britain 1,800; Panama 1,100; Trinidad 1,100; and Japan 700.
- **Refrigerated enclosures, commercial type** (12,800 — no previous figures): Canada 4,100; W. Germany 1,200; Saudi Arabia 1,100; Japan 1,000; and Britain 600.

Wholesalers

Air conditioning and refrigeration parts-and-supplies wholesalers feel that business in 1985 will move ahead of last year's total volume by 9.5%, according to a forecast by 61 members of the Air-Conditioning and Refrigeration Wholesalers (ARW).

The forecast varies slightly for the five regions of the U.S. from an anticipated gain of 7.1% in the Central region to an increase of 10.4% in the Southeast and 10.9% in the Northeast. Anticipated gain in the West is 9% and in the Southwest 9.8%.

It marks only the second year since ARW began conducting the survey in 1978 that its members forecast much real growth. Last year, when members forecast an 11.5% increase and experienced a 12.6% sales improvement, was the first. Wholesalers expect inflation this year to run about 4.3% (average) or 5% (median).

Because ARW wholesalers are traditionally oriented toward parts and pieces, their business depends much more on the number of system repairs being made in a given year than on the

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much more volatile equipment market. For this reason, ARW members tend to experience flat sales periods rather than declines during recession years.

For example, when unitary shipments declined by 21% in 1982, ARW member volume increased by 2.2% and, when unitary shipments rebounded by 43% a year later, the increase for ARW wholesalers was a more modest 12.6%.

The greatest percentage gain among product categories in 1985 will come from the sale of unitary air conditioning and heating equipment with capacities of 4 tons or less. The anticipated 10.2% national average gain ranges from 4.5% in the Southwest and 7.5% in the Central region to 14.3% in the Northeast and 14.4% in the West. The Southeast expects an 11.6% increase in this category (see table on page 124).

Unitary air conditioning and heating equipment with capacities of more than 4 tons (commercial) also is expected to show a respectable 8.7% sales gain this year. Wholesalers in the Southwest are expecting a 16.1% increase in commercial equipment sales.

Replacement items also are expected to show solid performances in 1985. Replacement compressor sales are expected to increase by 8.7% — 12.4% in the Southeast — and electric motors by 8.9%, with increases of more than 12% expected in the Southwest and West.

The weakest projected change, at 2.8%, is again water treatment and maintenance chemicals followed by sheet metal and fittings and instruments and test equipment, both at 4.9%.

It might be noted that the Northeast, in 1984, expected the smallest sales gain of any region at 10.1%. A year later the Northeast, at 10.9%, forecast the largest overall sales gain for 1985.

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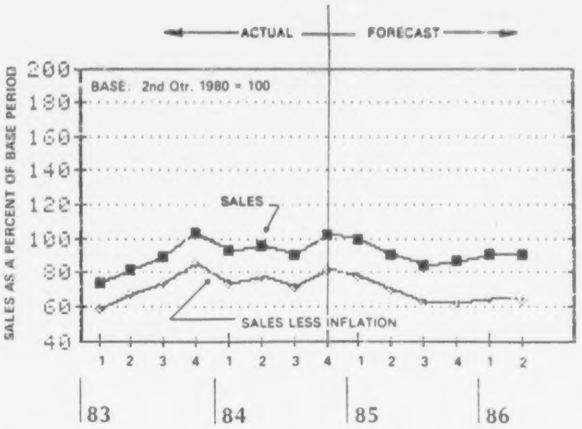
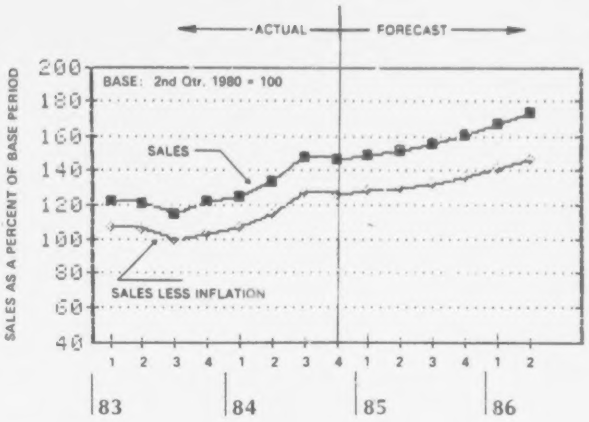
NHAW forecast

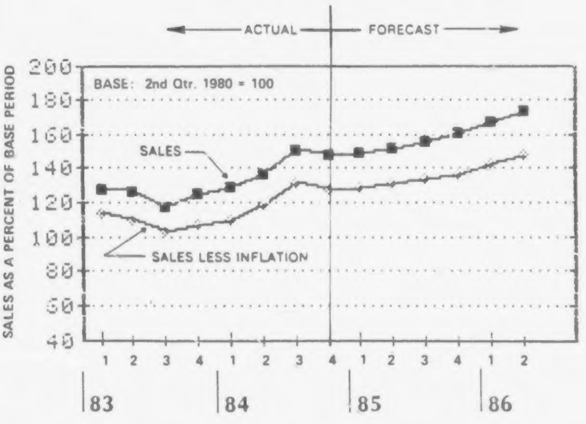
Air conditioning



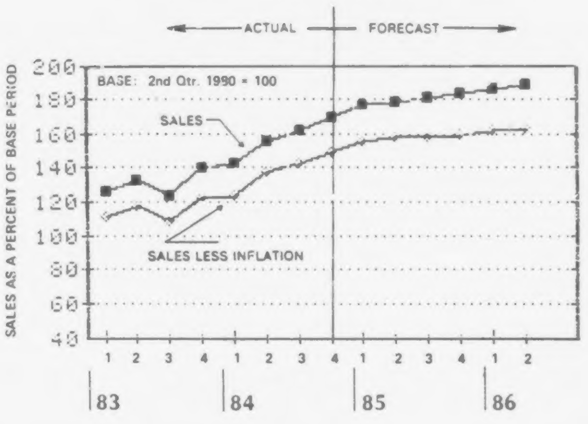
Refrigeration



Controls



Sheet metal



Bureau of the Census data

A 10-year look at air conditioning and refrigeration unit shipments

Product	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**
Condensing units	474,771	334,679	417,286	529,515	537,082	497,833	455,695	439,714	379,787	426,299
Compressors and compressor units	19,134,563	19,240,243	22,761,950	23,991,643	25,790,862	24,970,111	19,829,319	21,233,348	17,433,817	19,781,338
Ammonia compressors	**1,714**	**1,449**	**1,453**	**1,443**	**1,819**	**2,014**	**1,860**	**1,808**	**1,509**	**1,190**
Screw compressors	—	—	—	—	—	—	**5,809**	**5,320**	**2,620**	**3,601**
Fancoil units[2]	284,267	200,807	193,587	198,939	186,827	178,719	245,127	253,832	207,232	214,799
Induction units[3]	38,422	42,636	21,112	—	—	—	33,343	—	—	—
Central-station air handlers	**53,621**	**47,691**	**48,616**	**52,371**	**52,441**	**60,266**	**60,841**	**59,866**	**58,961**	**56,374**
Unitary air conditioners[4]	**2,392,193**	**1,561,385**	**2,399,638**	**2,829,447**	**3,226,998**	**3,057,009**	**1,881,465**	**1,991,507**	**1,568,838**	**2,075,140**
Unitary heat pumps (air-to-air)	119,983	160,485	320,043	536,558	371,436	646,926	508,457	604,903	408,742	660,956
Water-source heat pumps[1]	—	—	—	—	—	—	69,931	69,689	86,092	68,300
Packaged terminal air conditioners	**268,253**	**189,927**	**182,608**	**261,777**	**148,332**	**183,274**	**143,212**	**143,427**	**135,741**	**150,073**
Packaged terminal heat pumps[1]	—	—	—	—	—	—	—	**32,439**	**52,512**	**58,753**
Room air conditioners	4,244,586	2,648,430	2,805,124	3,303,335	4,030,423	3,757,102	3,178,993	3,722,509	2,883,156	1,891,434
Centrifugal chillers[5]	4,496	4,647	2,994	2,977	2,975	3,141	4,200	3,938	3,893	4,089
Reciprocating chillers	**11,130**	**9,279**	**7,114**	**8,665**	**9,003**	**9,695**	**12,325**	**12,090**	**11,668**	**10,543**
Absorption chillers	**1,087**	**740**	**571**	**588**	**470**	**392**	**279**	**239**	**199**	**135**
Adsorption, open-type absorption	—	1,672	1,866	2,318	2,704	2,503	2,962	3,171	1,461	1,044
Cooling towers[2]	13,950	13,212	11,156	8,517	9,906	—	12,185	15,381	11,222	11,304
Evaporative condensers	**3,112**	**2,764**	**2,094**	**2,299**	**2,453**	**3,263**	**2,881**	**2,859**	**2,166**	**2,086**
Mobile vehicle air conditioners	**6,891,353**	**9,137,453**	**11,978,679**	**9,459,535**	**9,074,932**	**7,651,198**	**5,852,328**	**6,059,342**	**5,651,329**	**9,004,192**
Mobile air conditioners for trucks, agricultural, construction equipment	905,993	1,412,508	2,320,911	2,452,820	1,298,198	1,352,198	764,942	834,174	1,064,381	1,556,310
Mobile vehicle refrigeration systems[6]	67,494	63,864	70,836	76,536	70,731	76,395	60,301	66,773	68,843	66,502
Recreational vehicle air conditioners[1]	—	—	—	—	—	—	**93,919**	**119,566**	**142,227**	**156,689**
Unit coolers[7]	**186,312**	**161,287**	**195,738**	**197,975**	**194,905**	**187,434**	**175,371**	**169,487**	**163,697**	**187,762**
Ice-making machines	124,075	128,288	187,887	165,106	194,049	218,827	166,725	165,626	150,475	165,766
Drinking water coolers	373,723	262,173	307,570	335,173	373,885	411,687	409,782	432,733	373,560	429,258
Dehumidifiers	**645,287**	**525,407**	**502,141**	**351,188**	**477,692**	**728,148**	**734,738**	**540,386**	**438,833**	**610,179**
Humidifiers (central and self-contained)[1]	—	—	—	—	—	—	**423,986**	**396,413**	**310,342**	**324,948**

Source: Bureau of the Census Current Industrial Reports MA-35M, Air-Conditioning and Refrigeration Equipment, including Warm Air Furnaces. [1]New category since 1980. [2]Excludes vertical stack units in 1977. [3]Withheld to avoid disclosing operations of individual companies. [4]For years 1980 through 1983, add these figures to those for unitary heat pumps (air-to-air) and subtract exports from that total to get comparable industry figures. [5]Excludes open-type units for 1978 and succeeding years. [6]Excludes railway freight cars for 1978 and succeeding years. [7]Excludes floor-mounted dry and spray types for 1979 and succeeding years.

Percent of dollar value potential for 1985 vs 1984

	Northeast	Southeast	Central	Southwest	West	Total	Canada
Unitary AC&H equipment (4 tons and under)	14.3	11.6	7.5	4.5	14.4	10.2	7.3
Unitary AC&H equipment (over 4 tons)	8.1	11.4	4.2	16.1	8.0	8.7	5.2
Refrigeration condensing units	5.6	5.4	7.9	12.7	10.4	8.0	3.0
Refrigeration coils	5.3	6.5	6.5	12.7	11.4	8.0	11.1
Replacement compressors	4.5	12.4	6.8	8.2	8.2	8.7	10.6
Refrigerant	4.5	7.9	3.5	6.7	5.6	5.8	—1.2
Driers, strainers, filters, and sight glasses	3.9	9.4	5.1	7.5	9.7	7.3	10.6
Refrigerant flow controls — TEV, solenoid, regulating valves, etc.	3.4	3.2	5.4	6.9	9.7	5.2	5.9
Pressure and temperature controls	3.2	3.4	5.5	8.3	7.0	5.2	6.2
Electrical controls — relays, contactors and starters	3.4	11.2	6.1	6.9	7.3	7.7	7.8
Capacitors	2.6	9.7	6.4	10.0	6.2	7.4	5.6
Electric motors	2.4	10.6	6.1	12.9	12.6	8.9	2.1
Pipe and tubing fittings	5.4	6.6	3.8	8.2	5.7	5.8	—0.6
Pipe and tubing insulation	5.3	8.1	3.8	8.1	4.4	6.0	n/a
Grilles, registers, and diffusers	0.0	12.6	7.0	8.7	6.6	8.3	n/a
Sheet metal and fittings	5.0	1.1	6.9	8.7	6.0	4.9	16.3
Air filters and air cleaners	2.4	8.2	5.2	8.6	10.4	7.0	3.4
Water treatment and maintenance chemicals	0.7	1.8	3.5	2.3	5.7	2.8	8.5
Instruments and test equipment	3.7	4.3	5.7	4.0	6.4	4.9	3.5
Totals	**10.9**	**10.4**	**7.1**	**9.8**	**9.0**	**9.5**	**6.7**

1985 SALES FORECAST undertaken by members of the Air-conditioning and Refrigeration Wholesalers (ARW) shows an overall gain of 9.5% in dollar volume over 1984. While a total of 61 firms submitted data for the 1985 forecast, not all indicated their region. Therefore, percentages shown in the "U.S. Total" column do not equal the average of all region data combined. Rather, the "U.S. Total" column represents the average of all respondents, including those who did not indicate their region.

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The region includes wholesalers in Maine, Connecticut, New Hampshire, Vermont, Massachusetts, New Jersey, New York, and Pennsylvania.

Canadian sales in 1985 are expected to increase by 6.7% and inflation is expected to be about 3.2% (average) to 3.5% (median). Sales in Canada will be paced by sheet metal and fittings, with an anticipated 16.3% increase, by refrigeration coils (up 11.1%), and by replacement compressors and driers, strainers, filters, and sight glasses, all up 10.6%.

Refrigerant sales in Canada this year are expected to decline by 1.2% and pipe and tubing fittings should drop by less than 1%. Electric motor sales are expected to increase by only 2.1% but unitary equipment of 4 tons and under should do 7.3% better this year than last. Eight wholesalers took part in the Canadian survey.

Members of the Northamerican Heating and Airconditioning Wholesalers Association (NHAW) use a three-year forecast, revised each quarter, for five key product groups: air conditioning, refrigeration, controls, sheet metal, and plumbing. The air conditioning category includes warm air and radiant heating equipment as well as heat pumps, humidifiers, filters, and air solar heating panels. The plumbing category includes liquid solar collectors.

For the NHAW outlook in chart form, see the accompanying charts on page 122. The second quarter of 1980 has been used for the base period, or "100" on the charts. The top line represents seasonally adjusted sales levels and the bottom line, because it's adjusted for inflation, is essentially a forecast of unit sales.

The forecast is prepared for NHAW by William Spooner and Associates, Inc., using an econometric model maintained by the University of California-Los Angeles (UCLA) and sales data supplied by NHAW members.

It provides members with forecasts in three modes — one that reflects seasonal fluctuations and unadjusted dollar volumes, one that is annualized to eliminate seasonal fluctuations, and the charts we have used here which shows both.

The study released in January, 1985, shows that **air conditioning sales,** after a double-digit improvement in

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1984, are expected to decline slightly through the first three quarters of 1985 and then resume moderate growth in 1986. It expects furnace sales to decline by only 1% while unitary air conditioning sales could decline by as much as 5%.

Refrigeration sales, which include refrigerants, parts and supplies, along with **controls** and **sheet metal**, are expected to grow in line with — or even ahead of — the overall economy.

Plumbing sales also should grow in the period, but at a more moderate pace, helped by the high level of new home construction and bathroom modernization.

In its introduction, Spooner warned about the "great unknowns:" Whether mortgage interest rates have bottomed out, whether foreign investments in the U.S. will decline and so increase domestic competition for available capital, or whether corporate cash flow problems will cut investments in new plants and equipment.

"The overall economy did better than many expected in the last quarter of 1984," Spooner said. "Large gains in industrial building and in office construction were at least partially responsible. However, the growth in nonresidential construction may slow to just 4% in 1985. It grew by 15% in 1984."

The econometric model indicates that housing should remain about the same in 1985 as in 1984 but the National Association of Home Builders (NAHB) expects a 5% drop in new home starts. The biggest worry for builders is the possible federal tax reform and its negative impact on housing, Spooner said. Inflation should stay between 3.5% and 4% into 1986.

The replacement market

Even though the new construction market manages to steal most of the headlines, the replacement markets for comfort cooling, heat pumps, boilers, furnaces, and accessories continued strong in 1984 and promise continued advances this year.

In fact, Sweet's Division of McGraw-Hill Information Systems Co. reports that, in 1983, the renovation/rehabilitation market outstripped new construction in annual dollar volume for the first time. Commercial renovation was estimated at $67.5 billion in 1984, just a shade more than the $65 billion in residential renovation.

The renovation/rehabilitation market still is very much a "hidden" market, Sweet's Div. reported in its report, "Renovation's Rewards: A 'Hidden' Construction Market Pays Off." Due to its inherent qualities, this market is more difficult to track statistically than any other.

Interiors magazine reported that 60% of design work today is in office remodeling rather than in new construction. Not only has the cost of land and construction escalated dramatically in recent years, but many firms report that their present location is an important factor.

Too, the Economic Recovery Act of 1981 generally raised the 10% tax credit to 25% and extended the credit beyond commercial and industrial structures to historic rental residential properties. It also introduced tax credits for the rehabilitation of structures other than those certified as historic properties. Buildings over 30 years old could qualify for a 15% tax credit and those 40 years old or more could qualify for a 20% credit.

Additionally, the Act introduced a 15-year cost recovery period for the adjusted life of rehabilitated buildings. Previously, the "useful life" of a building for tax purposes usually was 30 years.

The cities actively involved in renovation between 1981 and 1983, together with the number of projects submitted to the National Park Service in parenthesis, were listed by Sweet's as:

East: Baltimore, Md. (344); Washington (263); Albany, N.Y. (217); Philadelphia (214); and Hartford, Conn. (190). Midwest: St. Louis, Mo. (350); Chicago (80); Minneapolis-St. Paul, Minn. (74); Denver, Colo. (67); and Kansas City, Mo. (35). South: New Orleans, La. (283); Savannah, Ga. (275); Louisville, Ky. (178); Charleston, W. Va. (154); and Atlanta (31). West: Portland, Ore. (33); Seattle, Wash. (31); Boise, Idaho (12); Tacoma, Wash. (11); Spokane, Wash. (11); and Honolulu (11).

Building Design & Construction estimates that the average annual dollar total for the nonresidential renovation market for hvac systems and equipment amounts to $656.9 million, the highest of all categories. Another $524.4 million would go for plumbing, piping, and valves and $244.6 million for energy management systems.

Renovation and remodeling in the housing industry represented only 20% of total expenditures in 1960, according to a study conducted by the U.S. Department of Housing and Urban Development (HUD). This share rose to 33% in 1970 and 42% in 1980. The National Association of Remodeling Industries (NARI) projected residential remodeling as a $73.2 billion annual market by 1988.

The National Association of Home Builders (NAHB) reported that the residential renovation market totaled $50 billion in 1983 and $65 billion last year, a 30% increase. The Bureau of the Census, in its C50-83-A Construction Reports, said residential alterations and repairs in 1983 totaled $49.295 billion, up 8.8% from the $45.291 billion total a year earlier. The total for the first three quarters of last year, at $50.1 billion, was more than for all of 1983.

The Census Bureau reported that, of the total spent for alterations and repairs in 1983, heating and central air conditioning accounted for $3.714 billion, or 7.5%, and represented a 15% increase over the $3.23 billion spent a year earlier.

Of the $3.714 billion spent for heating and central air conditioning system alterations and repairs in 1983, the Census Bureau reported that $991 million, or 26.7%, was for maintenance and repairs; $701 million, or 18.9%, was for additions and alterations; and $2.022 billion, or 54.4%, was for "major replacements." The replacement segment increased by 18.5% over the $1.707 billion spent in 1982 — but was 18% lower than the $2.459 billion the bureau said was spent for heating-cooling replacements in 1980.

An NAHB National Remodelers Council survey conducted in the third quarter of 1984 reported that remodelers expected business conditions to be good through March, 1985. However, a quarter of them expected labor availability and affordable consumer financing would be poor.

Two-thirds of those responding to the survey indicated that residential remodeling was their most important operation. The rest were divided equally between commercial remodeling, custom home building, and restorations. Of the total, half (47%) do a volume of less than $250,000 a year and eight of ten (78%) have been in business for five years or longer.

Air conditioning

In the case of unitary air conditioning, the replacement market must be separated into three parts — home comfort cooling, heat pumps, and commercial.

If we subtract 745,195 heat pumps from the 3,308,428 unitary shipment total for 1984, we get 2,563,233 comfort cooling units — or which 2,050,586 units, or 80%, were residential and 512,647 units, or 20%, were commercial.

This split was selected because it matched the determination of the Air-Conditioning and Refrigeration Institute (ARI) for 1983, the latest year for which a split was available. And if you're comparing this split with the one found in the section on air conditioning, remember that these figures do not include heat pumps.

Of the 2,050,586 residential cooling units shipped in 1984, we estimate that 41.2%, or 845,600 units, went into new construction (448,100 single-family and 397,500 multifamily installations). These figures were arrived at by multiplying known penetration rates for air conditioning by the known number of housing starts and subtracting the number of heat pumps.

Looking back at the 849,700 comfort cooling units we estimated were installed in new homes in 1983, last year's figure represents a 0.5% drop despite the fact that overall housing construction increased by 2.5%. The reasons for the inconsistency could be many but principal among them would be the shift in single and multifamily shares and the fact that we are applying the penetration rates for completed homes to housing starts.

The other residential cooling units break down this way: 842,500 units, or 41%, were replacements — a 75% increase over the 481,500 replacements (29.5% of shipments) estimated for 1983; 307,500, or 15%, were add-on units 40,000 were new manufactured home units; and 15,000 were manufactured home replacement units.

The increase in the number of cooling-only replacement units may not be quite as dramatic as the 75% increase in a single year would appear to indicate. As stated in these pages a year ago, we were suspicious that the 1983 totals were masked by changes in inventory levels taking place at that time and should have been higher. In 1985, with the benefit of hindsight, those suspicions have been confirmed. If, as mentioned, we had added 130,000 units to the 1983 total, the increase would have been a more creditable 38%.

There is no doubt, as discussed in "Comfort in construction," that the driving force of 50 electric utilities offering rebates based on efficiency has had the effect of improving the replacement market at an even faster rate than the already fast-expanding market of 12- to 15-year-old units due for replacement. Add in a relatively stable economy and some hot weather and the promise is for strong replacement sales into the forseeable future.

Looking ahead, we feel that cooling-only units going into new residential construction will decline slightly in 1985 to 815,000 units, add-ons will decline to 236,000 units, manufactured housing units again will total about 55,000 units, but replacements will increase to 861,800 units, or 43.8% of the market.

Of the estimated 512,647 commercial cooling units shipped last year, we estimate that 70%, or 358,900 units, went into new construction and 30%, or 153,800 units, were replacements. But of the 149,000 commercial heat pumps we estimate were shipped last year, about 90%, or 134,100 units, went into new construction and only 10%, or 14,900 units, were replacements.

In the case of the 596,200 residential heat pumps we estimate were shipped last year, it would appear that 490,200 went into new construction (324,000 into single-family and 166,200 into multifamily homes). This represents only a modest increase over the 463,200 for this market a year earlier.

Of the remaining residential heat pumps, we estimate that 15,000 were add-on units (on fossil fuel-fired furnaces), 5,000 went into manufactured homes, and 86,000 (14%) were replacements.

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The replacement market

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Looking ahead, we can look forward in 1985 to slightly higher new multifamily market shipments, a stable replacement market, and only small declines in the other market segments. The total for all air-to-air heat pumps should be about 700,000 units, about 6% lower than last year.

Add-ons

The add-on market for residential comfort cooling, fed by the desire of homeowners for the comfort of central air conditioning without the need to buy a new home, once led replacements by a wide margin. But as the market has matured, the number of add-on air conditioners keeps diminishing.

For example, as late as 1981 add-ons had an estimated 29% market share. We believe this share slipped to 24% in 1982 and to 15% in each of the last two years. Next year, add-ons will sink a bit lower, to 12%. Percentages, however, can be deceiving. In years when new home construction is down, the percentage of add-on units tends to be higher than in years, such as the last two, when home construction is up. Yet the add-on numbers stay relatively stable.

On the positive side, more than half a million homeowners added high-efficiency furnaces last year. Many of them (three of four) replaced inefficient furnaces in good working order.

Although it's reasonable to expect that many of these people already had comfort cooling — and may have replaced that for efficiency reasons as well — it's also reason to assume that some did not have air conditioning. And because the contractor who installed the new furnace probably also offered air conditioning, it's probable that this relatively new market development was of indirect benefit to the add-on cooling market. We wouldn't attempt, however, to quantify that impact, which is a reversal of a past phenomenon whereby many homeowners were influenced to buy a new furnace when they added central cooling.

Boilers

Of the 270,456 residential boilers shipped in 1984, we estimate that only 43,200 went into new single-family homes. When about 5,000 boilers for new multifamily homes are taken into account, the total comes to 48,200 units, or 18% of shipments. The other 222,256 units, or 82%, were replacements.

It might be noted that the gas conversion phenomenon, which distorted residential gas boiler shipments for two years, is over. Today's market is on a more normal footing and oil-fired units have regained much of the ground lost at the turn of the decade.

Furnaces

Of the 148,025 residential oil furnaces shipped last year, we estimate that 17,300, or 12%, went into new single- and multifamily homes. This means that 130,700 oil furnaces, or 88%, were replacements.

Not to be forgotten, too, are the 443,690 replacement oil burners shipped in 1984, down 3.8% from the 461,291 replacement burners shipped in the previous year, according to Fuel Oil/Oil Heat and Solar Systems. The magazine estimated that 80% of these burners were retention-head or other high-efficiency types.

Of the 1,849,200 residential gas furnaces shipped in 1984, we estimate that 623,000 (33.7%) went into new single- and multifamily homes, 50,000 were conversions from other fuels, and the remaining 64%, or 1,176,200 units, were replacements.

For comparison, 650,000 residential gas furnaces (39% of the 1,661,765-unit total) went into new construction in 1983, 50,000 were conversions from other fuels, and 960,000, or 58%, were replacement units.

Importantly, actions by homeowners anxious to control rising fuel bills have resulted in the development of a whole new market within the past three years — a market that centers around the replacement of inefficient equipment in good working order for the sake of efficiency.

For example, the inefficient (below 65% annual fuel utilization efficiency) atmospheric gas furnaces that represented almost the whole market only four years ago had shrunk to a 26.7% market share in 1983 and only a 19% share last year. (See "Comfort in construction.")

At the other end of the spectrum, 256,120 gas furnaces shipped in 1983, or 15.4% of the total, had AFUE's of 80% or better. Last year that percentage had doubled to 31% and the total had swelled to 574,595. Most of those were replacements.

Similarly, the Gas Appliance Manufacturers Association (GAMA) also reported that 24.2% of oil furnaces shipped in 1983 had AFUE's of 80% or more. Last year the percentage had increased to 32.2% and the total for this category had swelled to 47,645 units.

Looking ahead, it would appear reasonable to assume that, in 1985, four out of ten gas- and oil-fired furnaces shipped by manufacturers will have AFUE's of 80% or better. It must be remembered, too, that this has been accomplished almost wholly by natural market demand and virtually without incentives.

Our unofficial estimates of unitary market shares

When it comes to figuring the shares of the unitary air conditioning market held by individual manufacturers, we must rely on "feel" rather than reliable numbers. There are no reliable numbers.

Each year, too, the percentages shift a bit as companies enter or leave the market, one company is acquired by another, or distribution-product-promotion improvements are reflected in the marketplace.

And like all national figures, they don't give a clear picture of market shares in any specific city or area of the country. In fact, some of the essentially regional manufacturers, with a small national share of the market, often are among the leaders in those areas where their distribution is concentrated.

Another distortion comes from the

interest of the reader. Whether a particular manufacturer is strong in the new-home or the add-on market makes little difference to many. But to a contractor who specializes, the list of competitive brands can expand or contract according to his interests — and change when his emphasis changes.

Because of these and other situations within their own cities, contractors often get a distorted view of national market shares. For them, and for researchers and others not deeply involved in the air conditioning industry, The News offers these educated guesses of unitary equipment market shares in units:

Carrier (including Bryant, Day & Night, Payne) — 24%.

Lennox — 13%.

Rheem-Ruud — 13%

Trane — 13%

Whirlpool, Heil-Quaker — 8%

York (including Borg-Warner Environmental Systems) — 6%.

Snyder General (including Arco) — 4%.

Magic Chef (Johnson, Air Ease, Williams, Armstrong, Gaffers & Sattler), and Heat Controller — 2% each.

Fuel and energy

United States energy consumption for the first 11 months of 1984 was 67.139 quadrillion Btu (quads), about 6.16% more than the 63.245 quads consumed in the same 11 months of 1983 and 4% more than the 64.518 consumed in the same period in 1982.

The Department of Energy's Energy Information Administration (EIA), which reports these data, changed its reporting methods in 1983 and now runs about two months behind past performance. It's no longer possible to provide full calendar year statistics for the previous year in all categories.

The total energy consumed in the U.S. in 1983, the last year for which 12-month data is available, still was 5% below the 74.212 quad consumption level of 1973, the year of the Arab oil embargo.

In the residential-commercial sector (EIA lumps them together), the 23.426 quads consumed during the first 11 months of 1984 was 4.6% more than for the same period in 1983, but only 1.3% more than for the like period a year earlier. The 1983 full-year total of 25.471 quads represents a 5.5% increase over the 24.147 quads used by the residential-commercial sector in 1973.

During the first 11 months of 1984, this sector represented a 34.89% share of total energy consumption, down from a 35.5% share for the same period in 1983 and from a 37.05% share for the first 11 months of 1982.

Industrial sector consumption of 25.734 quads for the first 11 months of 1984 was up 9.1% over the 23.585 quads consumed during the first 11 months of 1983. It also represented a 7.44% increase over the 23.953 quads consumed during a like period of 1982. The 1983 full-year total of 26.045 quads was 17.2% lower than the 31.463 quads consumed by the industrial sector in 1973.

During the first 11 months of 1984, the industrial sector represented 38.33% of total energy consumption, up from 37% in 1983 and 36.56% in 1982.

Electric utilities consumed 23.898 quads of energy during the first 11 months of 1984, up 5.3% from the 22.685 quads consumed in the first 11 months of 1983, and up 7.47% from the 22.237 quads consumed by electric utilities during the same period of 1982. The 1983 full-year total of 24.998 quads for electric utilities was 25.9% higher than the 19.852 quads consumed in 1983.

Of the 25.471 quads of energy consumed by the residential-commercial sector in 1983, with the 1982 share in parenthesis, only 0.75% (0.8%) was coal; 27.44% (29%) was natural gas; 9.2% (9.7%) was petroleum; 18.39% (17.8%) was electricity sales; and 44.21% (42.7%) was electricity generation and transmission losses.

Similarly, the 26.045 quads used by the industrial sector in 1983, with the 1982 share in parenthesis, broke down this way: 9.44% (10%) coal; 26.07% (27%) natural gas; 29.79% (30%) petroleum; 0.12% (0.13%) hydroelectric; 10.17% (9.74%) electricity sales; and 24.47% (23.44%) electricity generation and transmission losses.

In order to get a gross measure of conservation, DOE records show that it took 59,500 Btu to generate each constant dollar of gross national product (GNP) in 1973. In the third quarter of 1984, it took only 44,600 Btu to generate a constant dollar of GNP, or 24.7% less than in 1973 and 3% less than at the same time a year earlier.

In simple terms, this means that the U.S. economy in the third quarter of last year produced at the rate of 1.645 trillion constant 1972 dollars worth of goods and services with 24.7% greater energy efficiency than in 1973. Had it not been for this improvement in efficiency over more than a decade, U.S. energy consumption would have amounted to an annual rate of 91.49 quads in the third quarter of 1984 instead of the actual 73.371 quads.

Fuel costs

The average price of No. 2 fuel oil to U.S. homes in November, 1984, was $1.052/gallon, excluding any taxes, down 0.75% from $1.06/gallon in November, 1983. The 1984 price also was down 9.3% from the 1982 average price of $1.16/gallon, and down 11.9% from $1.194/gallon in 1981. The residential cost of No. 2 fuel oil in 1978, just before the second oil price shock, was 49 cents/gallon.

In November, 1984, the price of No. 2 fuel oil to homes ranged from 95.8 cents/gallon in Illinois and 97.1 cents/gallon in Oregon to $1.121/gallon in the District of Columbia and $1.117/gallon in New York City, according to EIA figures.

Average residential natural gas

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prices in the U.S. increased by only 0.5% from $6.06/1,000 cu ft in December, 1983, to $6.09/1,000 cu ft in December, 1984. The average price of residential natural gas, however, has increased by 65.5% from $3.68/1,000 cu ft in 1980, and by 372% from $1.29/1,000 cu ft in 1973.

In the case of specific cities, EIA reported that in December, 1984, the cost of residential natural gas expressed in dollars per 100 therms ranged from $49.763 in Los Angeles and $51.953 in Kansas City, Mo., to $77.57 in Philadelphia and $81.974 in New York City. Out of the range were Anchorage, Alaska, at $31.50/100 therms and $154.60 in Honolulu, where the only gas available is synthetic or LNG.

In October, 1984, the latest date for which EIA data were available, the average price of natural gas to industrial users was $4.06/1,000 cu ft, down 3.8% from $4.22/1,000 cu ft in October, 1983. The price of natural gas to industrial users has, however, increased by 163.6% since 1978 when it cost $1.54/1,000 cu ft.

The average price charged residential customers by privately owned electric utilities in November, 1984, was 7.61 cents/kWh, up 9.18% from the 6.97 cents/kWh charged in November, 1983. The 1984 price was 42% higher than the 5.36 cents/kWh average in 1980 and 199.6% higher than the 2.54 cents/kWh charged in 1973.

The average price privately owned electric utilities charged commercial customers in November, 1984, was 7.42 cents/kWh, up 4.06% from 7.13 cents/kWh in November, 1983, up 35.4% from 5.48 cents/kWh in 1980, and up 207.9% from 2.41 cents/kWh in 1973. The average price charged industrial customers in November, 1984, was 5.06 cents/kWh, up 4.76% from 4.83 cents/kWh in November, 1983, up 37.13% from 3.69 cents/kWh in 1980, and up 304.8% from 1.25 cents/kWh in 1973.

In more specific terms, the rate for 500 kWh of electricity in November, 1984, to U.S. homes, expressed in cents/kWh, ranged from 2.03 in Seattle, Wash., 4.35 in Portland, Ore., and 4.98 in Nashville, Tenn., to 10.80 in Boston and Philadelphia, 12.23 in San Diego, and 16.63 in New York City. Year-to-year increases of more than 20% were experienced by those in Seattle, San Francisco, and Philadelphia. Declines, all less than 4%, were recorded by Buffalo, N.Y., Richmond, Va., Kansas City, Mo., Rochester, N.Y., San Antonio, Texas, and St. Louis, Mo.

For commercial customers, the rate for 10,000 kWh of electricity together with 40 kW of demand in November, 1984, also expressed in cents/kWh, ranged from 2.18 in Seattle, 5.16 in Minneapolis-St. Paul, Minn., and 5.27 in Indianapolis to 10.23 in Newark, N.J., 11.37 in Boston, 12.77 in San Diego, and 15.76 in New York City.

For industrial customers, the rate for 200,000 kWh together with 500 kW of demand, also expressed in cents/kWh, ranged from 1.84 in Seattle, 3.94 in Indianapolis, 4.05 in Minneapolis-St. Paul, and 4.07 in St. Louis to 8.15 in San Francisco, 11.61 in New York City, and 11.96 in San Diego. In the past year, the industrial rates increased by 20% or more in Denver, Colo., Miami, Philadelphia, Portland, Ore., San Francisco, and Toledo, Ohio. But Washington, D.C., reduced its industrial rate by 11.7% and Rochester, N.Y., dropped its industrial rate by 20.4%.

Electricity

Total industry electricity output for the 52 weeks ended Dec. 29, 1984, was 2,438,724 million kWh, an increase of 4.1% over the total for the same period a year earlier, according to the Edison Electric Institute (EEI).

The increase reflects the growing economy. A year earlier electricity output declined by a hair to mark the third time in modern history when electricity output has not increased from one year to the next.

In terms of 1984 performance, the Rocky Mountain and Pacific states reflected slightly more than a 7% increase in electricity output. Increases in output for the rest of the country, particularly in the Midwest, were more modest.

The EIA reported that net electric power generation for the first 11 months of 1984 totaled 2,212,448 gigawatthours (GWh), an increase of 5.5% over the net generation total of 2,097,965 GWh for the same period in 1983. The 1984 experience revealed a 12.8% reduction in the amount of petroleum used to generate electric power, a 10.1% increase in the nuclear contribution, and a 30% increase in other sources, which include geothermal, wood, waste, wind, and solar.

Electricity sales to ultimate customers for the first ten months of 1984 and the same period in 1983 were: residential 654,198 GWh, up 3.7% from 630,919 GWh in 1983; commercial 485,358 GWh, up 6.4% from 465,003 GWh in 1983; industrial 704,468 GWh, up 9.9% from 641,238 GWh in 1983; and other 68,166 GWh, up 1.9% from 66,894 GWh a year earlier.

The installed nameplate generating capacity of U.S. electric utility generating plants on Nov. 30, 1984, was 665,836 megawatts (MW), of which 459,075 MW were in fossil steam, 69,384 MW were in nuclear, 79,243 MW in hydroelectric, 51,935 MW in gas-turbines, 4,835 MW in internal combustion, 1,354 MW in geothermal, 9 MW in utility-operated wind turbines, and 1 MW in solar.

Of the 34 power plants with a total capacity of 9.2 MW that were put in service in 1984, 13 were hydroelectric, 10 were coal-fired, three were wind-powered, two were nuclear, two were geothermal, two were natural gas-fired, one was wood, and one was solar. The combined capacity of the wind, solar, wood, and geothermal plants, however, was only 74,555 kW.

EEI reported that, at the end of the third quarter in 1984, the average number of electric utility customers totaled 98,656,000, a 2.5% increase over the 96,274,000 total a year earlier.

Nuclear

During November, 1984, U.S. nuclear power plants generated a total of 24.575 billion net kWh of electricity, a decline of 1.7% from the 25.010 billion net kWh generated in the same month a year earlier. The total for the first 11 months of 1984, at 268.633 billion net kWh, was 0.5% ahead of the 267.316 net kWh generated by nuclear plants during the same period in 1983.

Nuclear power supplied 13% of the electricity generated by domestic utilities in November, 1984, up slightly from the average of 12.7% for all of 1983. In February, 1984, the nuclear share climbed to 15% of the nation's domestic electric power needs.

As of November, 1984, there were 86 licensed U.S. power reactors with a collective net generating capacity of 69.5 thousand net-megawatts-electric (MWe), in increase of 8.4% from the 64.1 million MWe collective generating capacity a year earlier with 80 reactors.

Of the 86 operable reactors, five units were in power ascension and 30 units generated no electricity or operated substantially below capacity in November. Two units had licenses from the Nuclear Regulatory Commission for fuel-loading and low-power testing.

As of Nov. 30, 1984, there were 132 domestic nuclear power plants in all stages of planning, construction, operation, with an aggregate design capacity of 123 million net MWe. It is significant that no new nuclear power plants have been announced since 1978 and that, since then, plans for dozens of plants have been cancelled.

Natural gas

Gas utility thermal equivalent sales totaled 13.446 trillion Btu in 1984, an increase of 4.56% over the total of 12.859 trillion Btu in the previous year, according to the American Gas Association (AGA).

Industrial sales, which represent 47% of the total (the same as in 1983), totaled 6,323.3 trillion Btu in 1984, up 5.9% from the 5,970 trillion Btu total for 1983. Residential sales, which represented 34.3% of the total (34.2% a year before), amounted to 4,612.1 trillion Btu last year, up 3.6% from 4,450.2 trillion Btu in 1983. Commercial sales, which represented 17.6% of the total (17.7% in 1983), totaled 2,362.9 trillion Btu in 1984, up 2.8% from the 2,298.4 trillion Btu total a year earlier. The remaining 147.8 trillion Btu, or 1.09%, was for other uses in 1984.

AGA reported that average natural gas utility prices, expressed in dollars per million Btu, for the third quarter of 1984 were: all $5.05; residential $5.88; commercial $5.50; industrial $4.29; and other $4.76.

According to the EIA outlook, low natural gas prices are projected to result in higher consumption and production, but fewer additions to reserves than would have been the case with higher prices. The base case production in the lower 48 states is expected to average 17.2 trillion cu ft per year from 1985 to 1995. These conditions are expected to result in a net drain on reserves over time.

In the final years of the forecast, cumulative depletion of the lower-cost reserve base, coupled with stable gas demand, will lead to higher prices for new natural gas discoveries. These higher prices for new gas will, in turn, stimulate drilling for new reserves.

By 1995, EIA expects the average wellhead price will be $5.05/1,000 cu ft but that new discoveries of 15.9 trillion cu ft will receive about $5.30/1,000 cu ft at the wellhead.

Reserves

Prior to the passage of legislation in 1978, federal controls held the price of interstate natural gas well below the cost of competitive fuels. These low prices did not provide adequate incentives for new drilling and, as a consequence, gas reserves in the lower 48 states declined from 270 trillion cu ft (tcf) in 1969 to 163 tcf in 1979, a 40% decline.

The higher prices spurred drilling to an all-time high in 1982 and, by the end of that year, proved reserves had climbed to 201.5 tcf. World reserves of natural gas in 1982 totaled 3,222 tcf, of which nearly half was in eastern Europe.

As of Dec. 31, 1983, U.S. proved reserves were estimated at 27.7 billion barrels of crude oil, 200.2 tcf of dry natural gas (excluding gas in underground storage), and 7.9 billion barrels of natural gas liquids. Natural gas imports have provided approximately 5% of total U.S. gas consumption since 1970.

Exploration

Rotary rig and seismic crew activity during 1984 increased 8.8% and 4.4% respectively compared to 1983 levels but remained below the record high levels reached in 1981. Total well completions, at 81,979, were 7.4% more than the 76,329 completions in 1983 but 4.4% below the record 85,795 completions in 1982.

Oil well completions in 1984 were at an all-time high of 41,064, or 10.4% above the 37,207 total for the previous year. Gas well completions, at 15,692 in 1984, were a bit ahead of the 15,628 completions a year earlier but 17.2% less than the record high of 18,952 completions set in 1982. Total footage drilled in 1984, at 348,235 ft, was 6.9% more than the 325,760 ft drilled the previous year but 12.1% less than the record 395,993 ft drilled in 1982.

The January, 1985, rotary rig count of 2,452 was 8% less than the January, 1984, count of 2,666. The 242 rigs operating offshore during January, 1985, represented a 12% increase over those operating offshore at the same time a year earlier. The year-end average seismic exploration for 1984 was slightly higher than for 1983; 4.5% for land crews, 4.3% for marine crews, and 4.4% for total crews.

Coal

Anticipating sustained economic recovery, the National Coal Association (NCA) forecasts that demand for bituminous coal and lignite in 1985 will reach a record 878 million tons, a 2.3% increase over last year's consumption estimated at 858 million tons.

Coal production, however, is expected to decline 1% from 874 million tons last year to 864 million tons in 1985, primarily because of the drawing down of coal stockpiles at electric utility plants that were built up in late 1984 in anticipation of a strike that never came.

Coal imports are expected to double this year to 2 million tons.

Domestic consumption of coal in 1985 will total 805 million tons, according to NCA's Economics Committee, an increase of 2.3% over the 782 million tons consumed in 1984. The 1984 total represented a 6.7% increase over the 733 million tons consumed a year earlier.

Exports are expected to decline by 3 million tons, or 3.9%, to 73 million tons in 1985. Exports dropped a marginal 1.3% from 77 million tons in 1983 to 76 million tons last year.

In 1985, it's estimated that 544 million tons will come from mines east of the Mississippi, 3.7% less than in 1984, and 320 million tons will come from mines west of the Mississippi, a 3.6% gain.

Electric utilities, which consume about three-quarters of U.S. coal pro-

TURN TO NEXT PAGE

Each Statistical Panorama includes the latest data available. Sources frequently revise their previous year's figures, which explains apparent discrepancies between the latest and earlier published data. Where sources give significantly varying information, that data is mentioned.

Fuel and energy

FROM PRECEDING PAGE

duction, are expected to increase their use of coal from 660 million tons in 1984 to 677 million tons this year, or 2.6%. Electric utility coal consumption last year increased by 5.8% from 624 million tons in 1983.

Utility coal consumption this year is predicted on a normal weather pattern and growth in the gross national product of between 2.1% and 3.2%. The growth rate in the electricity sector was pegged at 2.5% and coal's share of the electricity market is seen growing to 55% this year.

No improvement is seen for the domestic steel industry and metallurgical coal demand, at 43 million tons last year, will continue flat in 1985. Last year, however, was 16.2% better than the 37 million tons shipped in 1983.

Raw steel capacity utilization is expected to continue at about 60% in 1985, low by historical standards and considerably lower than expected for the mid-1980's. This utilization rate, combined with the increased use of electric furnaces and continuous casting, will result in 92 million tons of raw steel being produced in the U.S. this year, according to NCA.

Coal demand in the industrial-retail sector remains strong and will grow by 7.8% to 85 million tons in 1985. This sector grew by 9.7% last year from 72 million tons in 1983 to 79 million tons in 1984. Much of the growth this year will come from the Great Plains Coal Gasification Project, which require an increase in coal consumption from 2 million tons in 1984 to 5 million tons this year.

The recoveries of free world industrial economies are lagging behind the U.S. recovery, a factor that has hurt U.S. coal exports. Other factors include the strong dollar, limited international credit, and aggressive competition.

Overall, exports will total 73 million tons in 1985, a 3.9% drop from the 76 million tons exported last year. The 1984 figure was down marginally from the 77 million tons exported in 1983.

Overseas exports are expected to increase by 1 million tons to 57 million tons in 1985, with steam coal demand growing by 2 million tons and metallurgical coal demand dropping by 1 million tons. Exports to Canada will decline to 16 million tons, a 20% drop from the 20 million tons exported to Canada last year.

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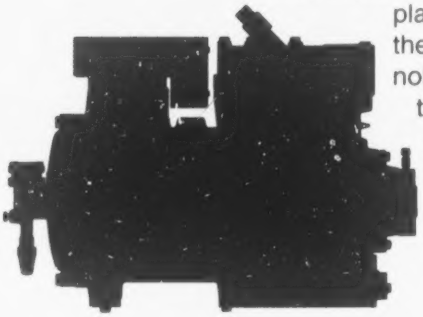

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